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## **Nuclear, Biological, and Chemical Weapons and Missiles: Status and Trends**

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# Nuclear, Biological, and Chemical Weapons and Missiles: Status and Trends

## Summary

The United States has long recognized the dangers inherent in the spread of nuclear, biological, and chemical (NBC) weapons, and missiles. Despite the preeminence of U.S. military power, or perhaps because of it, these weapons continue to pose very serious threats to the United States and its foreign interests. NBC weapons could be delivered by means ranging from ships or trucks that terrorist groups might employ, to aircraft, cruise or ballistic missiles of states. This report, which analyzes NBC weapons programs around the globe and potential threat patterns, is updated as needed.

The total number of nuclear, biological, and chemical weapons in the world is shrinking as the major powers scale back their inventories through unilateral reductions and arms control, but other countries and groups still try to acquire these weapons. There are five established nuclear weapon states (China, France, Russia, the United Kingdom, and the United States) and India and Pakistan declared their nuclear weapons capability with nuclear tests in 1998. Israel and North Korea are widely believed to have nuclear weapon arsenals, although neither has directly declared its capabilities. North Korea may have between 2 and 8 nuclear weapons. Recent international inspections in Iran have revealed significant strides in Iran's nuclear fuel cycle capabilities and many believe Iran to have a covert nuclear weapons program. Iraq and Libya are no longer states of proliferation concern; despite Libya's ability to procure significant nuclear components, its scientists lacked the wherewithal to proceed aggressively toward a nuclear weapon.

About a dozen countries have offensive biological weapons (BW) programs, and the same number have chemical weapons (CW) programs. That number could grow, as new technologies are developed and the international flow of information, goods, people, and technology continues. While the United States and Russia eliminated intermediate-range missiles and are reducing their intercontinental missile inventories, China is modernizing and expanding its missile force. North Korea, Iran, Israel, India, and Pakistan are building short- and medium-range missiles and are developing longer-range missiles. Dozens of countries have or are developing short-range ballistic missiles and more are likely to buy them. Over 80 countries have cruise missiles; about 40 manufacture or have the ability to manufacture them. And terrorists continue their efforts to acquire NBC capabilities.

Although Cold War NBC threats are greatly diminished, elements in North Korea, Russia, China, India, Pakistan, and other countries continue to export weapons technology. The potential for secondary proliferation markets has grown, and concern about the ability of individual actors like the Pakistani nuclear scientist, A.Q. Khan, to peddle nuclear technology has grown considerably. The number of countries or groups that will acquire or produce NBC weapons may decrease if diplomacy, arms control treaties, nonproliferation regimes, and security and assistance strategies are effective, but NBC weapons and missiles will remain a potential threat for the foreseeable future.

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# Nuclear, Biological, and Chemical Weapons and Missiles: Status and Trends

## Background<sup>1</sup>

In the mid-1990s, the primary threat posed by NBC weapons to the United States shifted from an all-out U.S.-Russian strategic exchange to less overwhelming, but more numerous and perhaps less predictable threats.<sup>2</sup> The dissolution of the Soviet Union had turned some Russian weapons of mass destruction (WMD) strengths into weaknesses and the fear of “loose nukes” prompted the U.S. government to help shore up the safety and security of Russian WMD infrastructure. Around the same time, U.N. inspections uncovered Iraq’s massive NBC weapons programs and a crisis erupted over the North Korean nuclear weapons program. It could no longer be assumed that the United States would face symmetric or parallel threats. A “paradox of the new strategic environment,” according to then-Secretary of Defense William Cohen, was that “American [conventional] military superiority actually *increases* the threat of nuclear, biological and chemical attack against us by creating incentives for adversaries to challenge us asymmetrically.”<sup>3</sup> Accordingly, Congress has been concerned about the countries and groups that have nuclear, biological and chemical (NBC) weapons, are developing or trying to acquire them, and about those who have or seek missile delivery systems.

The heightened sense of vulnerability to terrorism since the attacks in September 2001, coupled with reports of al Qaeda pursuing biological weapons research and possibly radiological weapons, has focused attention on the connection between terrorism and WMD. In March 2002, President Bush stated that “...every nation in our coalition must take seriously the growing threat of terror on a catastrophic scale — terror armed with biological, chemical, or nuclear weapons.” The unpredictability of terrorist efforts to acquire NBC weapons and a potentially higher probability of use pose a serious challenge to global stability and security. In particular, the Bush Administration has singled out state sponsors of terrorism (e.g.,

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<sup>1</sup> Steve Bowman of the Foreign Affairs, Defense, and Trade Division contributed to the analysis in this report.

<sup>2</sup> Nuclear and biological weapons can cause massive casualties and other damage. The effects of chemical weapons are generally confined to smaller geographic areas and cause fewer casualties but can create panic in a poorly protected population. Although radiological weapons are sometimes considered in the WMD category, they are covered separately. See CRS Report RL31332, *Weapons of Mass Destruction: The Terrorist Threat*.

<sup>3</sup> Office of the Secretary of Defense, Report to Congress, *Proliferation: Threat and Response*, Nov. 25, 1997 (hereafter *PTR 1997*).

Iran, Iraq and North Korea) with NBC weapons programs as particular security threats. U.S. and allied leaders and analysts continue to debate the exact nature and extent of the WMD threat.

The status of nuclear, chemical, and biological weapons and missiles worldwide has changed only slowly over time. In absolute numbers, stockpiles are actually decreasing. Some U.S. and foreign analysts emphasize the positive impact of the demise of the Soviet Union and progress made in U.S.-Russian arms control and international arms control. Others emphasize the negative impact of the nuclear tests by India and Pakistan; missile tests by North Korea, Iran, India, and Pakistan; continuing transfers of dangerous technology particularly by China, Russia, and North Korea; and a growing interest in WMD among terrorists. This report provides background and analysis on U.S. policies regarding these complex national security issues. It focuses on the current threat and trends in nuclear, biological, and chemical weapons and missiles.

## **Implications for U.S. Policy Decisions**

Potential NBC weapons and missile threats to U.S. security interests affect important national security and foreign policy decisions, including:

- the size and nature of the U.S. military force structure
- U.S. weapons and equipment acquisition
- U.S. doctrine and strategy for homeland defense and military operations abroad, including U.S. training for NBC environments
- foreign policy and economic policy toward countries of proliferation concern and their neighbors.

In addition, the status and trends of these weapons are key factors in national and international debates regarding:

- whether the most dangerous threat or the most likely threat to U.S. security is nuclear, chemical and biological weapons delivered by terrorists, missiles, aircraft, or ships
- whether states or groups are acquiring NBC weapons and missiles to deter or to use against regional powers or the United States
- whether intelligence estimates should be based on the capability and/or intent of countries and terrorist groups to use NBC weapons and missiles
- whether U.S. intelligence collection and analysis resources are adequate
- whether the United States should emphasize a strategy of deterrence, preemption, or national defense
- the appropriate mix of defense (active and passive), export control, assistance, and arms control
- the appropriate mix of unilateral, bilateral, and multilateral approaches.

Effective U.S. national security policies depend on those key decisions. Whereas some “hard problems” in the past might have been relegated to a back burner — for example, how to counter biological weapons attacks in the United States by terrorists, or how to prevent particular countries from acquiring NBC weapons — their solutions are now top priorities for the United States since the September 11, 2001. Secretary of State Colin Powell noted in Senate testimony on April 24, 2002, that “There are terrorists in the world who would like nothing better than to get their hands on and use nuclear, chemical or biological weapons. So there is a definite link between terrorism and WMD. Not to recognize that link would be foolhardy to the extreme.”

In the last decade, the U.S. government has taken many steps to address NBC weapons proliferation.<sup>4</sup> According to the Bush Administration, past efforts relied principally on passive measures, such as arms control and nonproliferation regimes, export controls, and diplomacy. New efforts to complement this approach will focus on working “in concert with like-minded nations, and on our own, to prevent terrorists and terrorist regimes from acquiring or using WMD.”<sup>5</sup> In December 2002, the White House released the “National Strategy to Combat Weapons of Mass Destruction,” which divided policy into three pillars: counterproliferation to combat WMD use; strengthened nonproliferation to combat WMD proliferation; and consequence management to respond to WMD use.” Counterproliferation efforts include interdicting WMD materials, expertise and technology to hostile states and terrorist organizations, as well as deterrence, defense and mitigation. These efforts include, specifically, preemptive actions to “detect and destroy an adversary’s WMD assets before these weapons are used.”<sup>6</sup> Strengthened nonproliferation includes active diplomacy, multilateral regimes, threat reduction assistance, nuclear material and export controls, and nonproliferation sanctions. Finally, consequence management entails homeland defense against WMD threats. Despite sharper public focus, however, the actual problems have not become any more tractable. As before, it is likely that economic and political interests will be weighed against security concerns in determining how best to exercise U.S. political and economic clout to slow the proliferation of NBC weapons and missiles. A telling example of these conflicting interests was the decision not to confiscate a shipment of North Korean Scud missiles aboard the *So San* en route to Yemen in December 2002.<sup>7</sup> In 2004, the Bush administration chose not to press the Pakistani government to punish the nuclear scientist A.Q. Khan for selling nuclear technology (including a nuclear weapons design) to Iran, Libya, and North Korea.

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<sup>4</sup> See CRS Report 97-343, Proliferation Control Regimes: Background and Status.

<sup>5</sup> John R. Bolton, Under Secretary of State for Arms Control and International Security, “Beyond the Axis of Evil: Additional Threats from Weapons of Mass Destruction,” Remarks to the Heritage Foundation, Washington, DC, May 6, 2002 (hereafter “Beyond Axis of Evil”). [<http://www.state.gov/t/us/rm/9962.htm>].

<sup>6</sup> “National Strategy to Combat Weapons of Mass Destruction,” Dec. 11, 2002. See [<http://www.whitehouse.gov/news/releases/2002/12/WMDStrategy.pdf>].

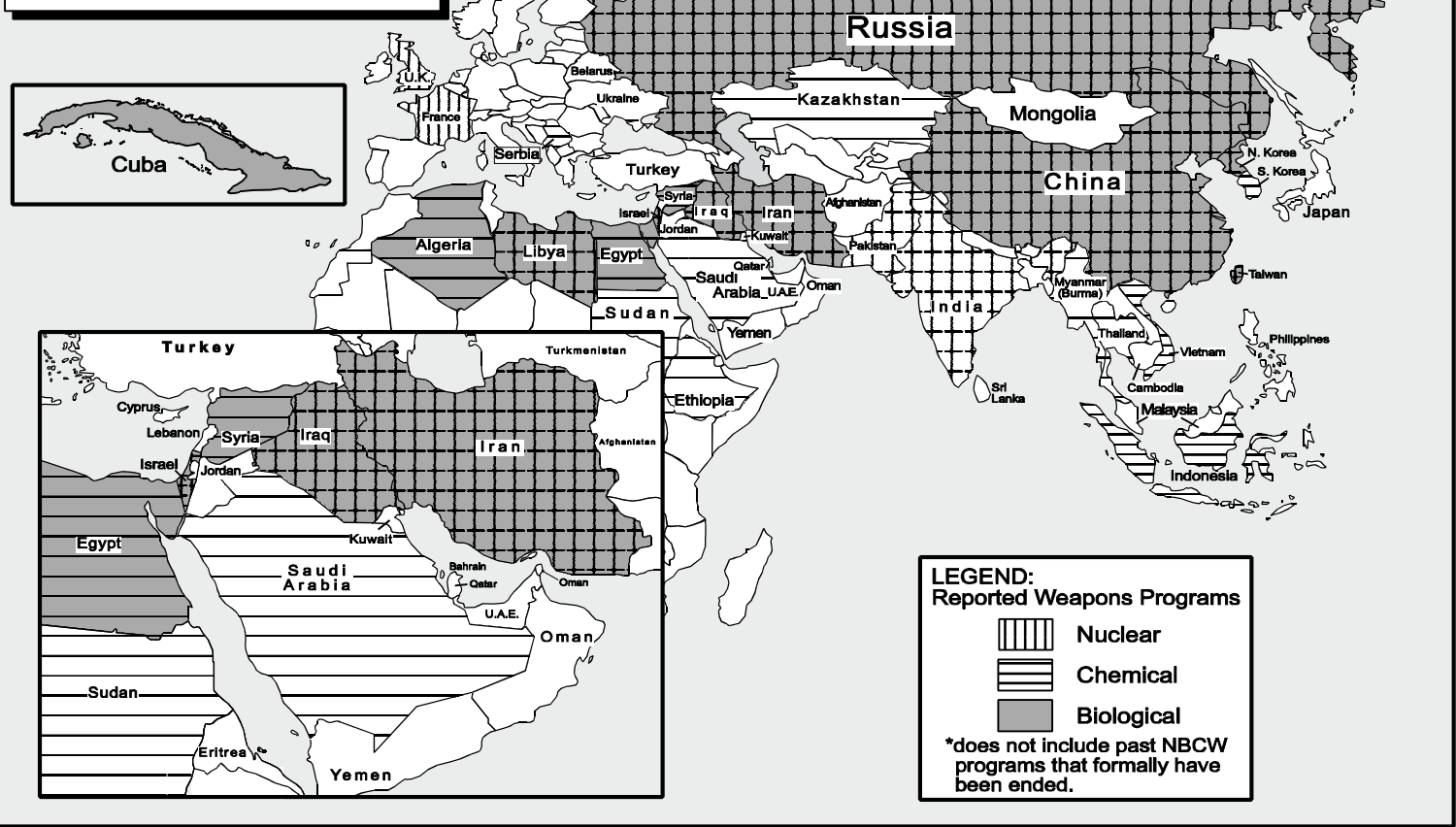
<sup>7</sup> “US Frees Ship With North Korean Missiles,” *Washington Post*, Dec. 12, 2002.

## **NBC Weapons and Missiles: Where Are They?**

About twenty-five countries, according to various U.S. government sources, are suspected of having nuclear, biological, or chemical (NBC) weapons programs or stockpiles. Figure 1 depicts a map of those countries and Table 1 (on page 11) lists those countries that have, or may have had NBC weapon programs and missile capabilities within the last several years. Table 1 distinguishes between stages of development — from a research and development (R&D) program, to acquiring components for weapons, to an actual stockpile. Most of these capabilities have been developed covertly and intelligence can vary dramatically not just among countries (e.g., we know a lot more about past Iraqi WMD development than we do about Iranian programs), but also among WMD programs for a single country. Nuclear and ballistic missile programs often have specific observable characteristics (e.g., flight tests, reactor operations) while biological and chemical weapons programs often do not. Moreover, Figure 1 and Table 1 do not attempt to portray a country's intent — how serious its pursuit of NBC weapons capability is, or what its ultimate objectives might be. These variables would have a significant impact on threat assessments of WMD capability.

In simple numbers, NBC weapons, missiles and programs have not grown much in the last decade, as proliferation by a few countries has been offset by reductions in weapons by others. However, some countries are actively building NBC weapon stockpiles and they are improving capabilities to deliver these weapons, taking advantage of widely available missile technology. These states are seeking or have developed indigenous production capabilities, and some have themselves become suppliers of NBC weapon or missile technologies. Some of these new suppliers either support terrorism or have terrorist activities on their soil. The potential for additional countries, or possibly terrorist groups, to produce NBC weapons using available technology, has become a greater concern in recent years.

**Figure 1. Current Nuclear, Biological, and Chemical Weapons Capabilities**



**Source:** Information based on public media and defense journals. Map adapted by CRS from Magellan Geographix. Used with permission.

**Notes:** The U.S. Government has not listed all the countries with NBC weapons programs in unclassified reports, but it has identified some of the countries. The media, foreign governments, and the academic community have reported others. The total number of nuclear, biological, and chemical weapon countries is in approximate accord with U.S. Government totals, but some of the listed countries may not be the same as those referred to by the Secretary of Defense, Director of Central Intelligence, or other officials in public reports. There is no attempt here to depict terrorist organizations' efforts to acquire WMD.



## Nuclear Weapon Arsenals and Programs

Five states are considered nuclear weapon states under the Nuclear Non-Proliferation Treaty (NPT): China, France, Russia, the United Kingdom, and the United States.<sup>8</sup>

Three others — Israel, India, and Pakistan — are generally considered to have nuclear weapons. Israel is said to have produced its first atomic weapon in the late 1960s and may now have between 100 and 200 weapons.<sup>9</sup> India and Pakistan tested nuclear weapons in 1998 and declared their nuclear weapons capability, removing the shroud of nuclear ambiguity on the subcontinent (India tested a “peaceful nuclear device” in May 1974). For a long time, North Korea was thought to have one or possibly two nuclear weapons.<sup>10</sup> As part of the 1994 Agreed Framework, North Korea froze its nuclear program, including operation of two graphite-moderated reactors and a plutonium reprocessing plant, and construction of two other reactors. In 2002, the Central Intelligence Agency (CIA) assessed that North Korea began to develop a uranium enrichment program in 2000 and is constructing an enrichment plant, which could be fully operational by 2005.<sup>11</sup> At this time, it is unclear what uranium enrichment capabilities North Korea might have. In early 2004, an unofficial delegation from the United States visited Pyongyang and were told that the spent fuel in storage had been reprocessed, which caused many analysts to update their assessment of the North Korean nuclear stockpile from 2 to about 8 weapons (the spent fuel pond contained about enough plutonium for 6 additional weapons). More information may be forthcoming if North Korea engages seriously in six-party talks.

All of these countries have aircraft that could be used to deliver nuclear weapons and all have missiles that may now or soon could deliver their nuclear weapons. In addition, India, Pakistan and Israel all have terrorist groups operating on their

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<sup>8</sup> See CRS Issue Brief IB10091, *Nuclear Nonproliferation Issues*. The NPT defines nuclear weapon states as those testing a nuclear device before January 1967 and therefore has no provision to admit new nuclear weapon states as parties to the treaty.

<sup>9</sup> Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press), 1998, p. 1; “Completing the Deterrence Triangle,” Carnegie Endowment for International Peace, Non-Proliferation Project, v. 3, no. 18, June 29, 2000.

<sup>10</sup> U.S. National Intelligence Council, Central Intelligence Agency (CIA), *Global Trends 2015: A Dialogue About the Future with Nongovernment Experts*. NIC 2000-02, December 2000, p. 36. The U.S. Department of Defense believes the DPRK produced and diverted enough plutonium prior to 1992 for at least one nuclear weapon. See Office of the Secretary of Defense, *Proliferation: Threat and Response*, January 2001 (hereafter *PTR 2001*). See also CRS Issue Brief IB91141, *North Korea’s Nuclear Weapons Program* and CRS Report RS21391, *North Korea’s Nuclear Weapons: How Soon an Arsenal?*

<sup>11</sup> Unclassified CIA point paper on North Korea’s Nuclear Weapons and Uranium Enrichment, released to Congress on November 19, 2002.

territory and North Korea is on the U.S. Department of State's list of state sponsors of terrorism.<sup>12</sup>

Iraq, Libya, and Iran reportedly have been trying to develop nuclear weapons, and there have been quite a few revelations about those programs in 2003 and 2004. The International Atomic Energy Agency (IAEA), which conducted inspections and disarmament activities in Iraq from 1991 to 1998 and November 2002 to March 2003, judged that Iraq had not reconstituted its nuclear program in any significant way. Prior to Operation Iraqi Freedom, CIA unclassified estimates judged that Iraq could produce nuclear weapons within a decade if it had to produce the fissile material itself, and within a much shorter period if it acquired weapons-usable material from elsewhere.<sup>13</sup> The U.S.-led Iraq Survey Group departed from Iraq in January 2005 and concluded there was no evidence of a revitalized nuclear weapons program.

Libya reportedly tried to acquire nuclear weapons for 30 years, and most observers believed it had made little progress. The Bush Administration had been concerned about enhancement of the Libyan nuclear infrastructure since U.N. sanctions were suspended in 1999.<sup>14</sup> On December 19, 2003, Libya agreed to give up all its WMD programs, following months of clandestine meetings with U.S. and British officials. Inspections by U.S., British, and IAEA officials revealed that Libya's nuclear procurement had been successful at least in procuring equipment, technology and material, thanks to a nuclear black market network directed by the Pakistani nuclear scientist A.Q. Khan. However, Libya was far from producing a nuclear weapon, even though it received a nuclear weapons design from the network.<sup>15</sup>

Perhaps the biggest revelations about nuclear weapons programs in 2003 and 2004 were about Iran. Although Iran is a non-nuclear-weapon-state party to the NPT, intensified inspections in 2003 revealed an array of dual-use capabilities that had not previously been reported to the IAEA, including centrifuge and laser enrichment capabilities and facilities, and the separation of a small quantity of plutonium. As a result of the inspections, Iran agreed on December 18, 2003 to sign the Additional Protocol to its nuclear safeguards agreement, which allows for enhanced inspections. The IAEA Board of Governors as of November 2004 had not determined that Iran was in violation of its NPT obligations but will continue to pursue its investigations. Although it had pledged to halt all uranium enrichment-related activities in return for a promise of technical assistance from the European Union, Iran continued to assemble centrifuge enrichment components.<sup>16</sup> Iran renewed and expanded its pledge

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<sup>12</sup> U.S. Department of State, *Patterns of Global Terrorism 2001*, May 2002, pp 10, 12, 53.

<sup>13</sup> Tenet, "Post-9/11 Threat," p. 15. Director of Central Intelligence (DCI) Tenet testified that "our major near-term concern is the possibility that Saddam might gain access to fissile material."

<sup>14</sup> John R. Bolton, "Beyond the Axis of Evil."

<sup>15</sup> See CRS Report RS21823, *Disarming Libya: Weapons of Mass Destruction*.

<sup>16</sup> "Iran plans to produce centrifuge parts, says Kharrazi," *BBC Monitoring Middle East*, July (continued...)

in November 2004 to encompass all enrichment and processing related activities. However, Iran has also made clear that this pledge is conditioned on the successful outcome of negotiations with EU states on political and security issues, technology and cooperation, and nuclear issues.<sup>17</sup> The official unclassified U.S. intelligence estimate in 2002 was that Iran did not yet have a weapon.<sup>18</sup>

Other governments have relinquished nuclear weapons on their territory (Belarus, Kazakhstan, Ukraine), dismantled their nuclear weapons (South Africa) or have abandoned or forsworn nuclear weapon programs (Argentina, Brazil, Germany, Japan, South Korea, Sweden, and Taiwan). Although sensitive nuclear technology exports have been controlled by the Nuclear Suppliers Group (NSG) since the mid-1970s, nuclear technology nonetheless has become increasingly available. The exposure of a nuclear black market in 2003 and 2004 with connections between the Pakistani nuclear scientist A.Q. Khan and Libya, Iran, and North Korea, has led many observers to propose further controls on nuclear exports. Some of these include a ban on export of reprocessing and enrichment technology by the NSG, a ban on development of reprocessing and enrichment by states that don't already have such capabilities, a legally binding agreement on export controls, and international management of reprocessing and enrichment. President Bush proposed, in a speech on February 11, 2004, to expand his Proliferation Security Initiative to encompass more than interdicting shipments; it would include shutting down facilities, seizing materials, and freezing assets.<sup>19</sup>

Another cause for concern is that the barriers to obtaining low-grade nuclear material for "dirty bombs" (radioactive as opposed to fissile material) also have been eroding for the last decade. In the mid-1990s, Chechen rebels and the Aum Shinrikyo cult tried to acquire and use radioactive materials in terrorist devices. Although those amounts were small, analysts agree it is feasible for terrorist groups to use conventional explosives to disperse deadly radioactive material on a wider scale.<sup>20</sup> The number of accounts in the press of individuals trying to buy or sell nuclear material has greatly increased in the last decade; while most are harmless scams, it is quite feasible that terrorists look on and learn what not to buy.

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<sup>16</sup> (...continued)

1, 2004. See also CRS Report RS21592, *Iran's Nuclear Program: Recent Developments*.

<sup>17</sup> See [<http://www.iranwatch.org/government/UK/uk-fco-iranagreement-111504.htm>] for the full text of the EU states - Iran November 15, 2004 agreement.

<sup>18</sup> Robert Walpole, CIA, statement for the record, Senate Governmental Affairs Committee, Subcommittee on International Security, Proliferation, and Federal Services, March 11, 2002, p. 5.

<sup>19</sup> See CRS Report RS21881, *Proliferation Security Initiative*.

<sup>20</sup> See CRS Report RL31332, *Weapons of Mass Destruction: The Terrorist Threat*. Some consider radiological devices "weapons of mass disruption" rather than weapons of mass destruction because the primary effect is fear and panic. Radiological devices do not have a nuclear yield (fission or fusion); they are simply conventional explosives wrapped around toxic material.

## Biological Weapon Arsenals and Programs

About a dozen countries have offensive biological weapons (BW) programs.<sup>21</sup> Public sources indicate two countries (Iraq and Egypt) are known to have BW, and several countries are likely to have BW, suspected of having BW, or are seeking BW. In addition, some sub-national terrorist groups reportedly have tried to develop or acquire BW. Because much of the material and equipment used to produce BW has legitimate medical, agricultural, or industrial purposes, and because BW could be produced covertly in a relatively small facility, other countries or groups may have undetected BW programs. However, some experts say terrorist groups would have difficulty obtaining sufficient materials and know-how to grow, handle, store and disperse biological agents to have a large-scale lethal effect.<sup>22</sup> A small volume of biological agent or toxin, if properly dispersed, could cause massive casualties in an unprotected densely populated area. The material could be dispersed from an aircraft or drone, from submunitions in artillery, rockets, cruise or ballistic missiles, or disseminated by terrorists. Each of the countries that reportedly has offensive BW programs has aircraft, artillery, and missiles. During the Gulf War, Iraq had BW warheads on some of its short-range missiles but apparently did not use those weapons.

## Chemical Weapon Arsenals and Programs

“At least sixteen states ... currently have active chemical weapons (CW) programs,” according to a cited statement by a CIA official in 1999.<sup>23</sup> Public sources have named 20 countries that were reportedly known or likely to have had chemical weapons capabilities in the late 1990s. Additional countries and a few terrorist groups were suspected of having or seeking CW.

Under the Chemical Weapons Convention (CWC), which went into effect in 1997, member countries will have to destroy their stockpiles by 2007. The United States, Russia, South Korea, and India acknowledged CW inventories. Neither the United States nor Russia will be able to meet the original deadlines for destruction of their CW stockpiles, and have been granted extensions to at least 2012. Twelve countries (including Libya) also reported facilities for the production of CW and have pledged to destroy them or convert them to civilian uses. Other countries may be prevented from acquiring precursor materials needed to produce chemical weapons by export control and monitoring mechanisms. The effect of the CWC has probably been to reduce the number of parties with chemical weapons and to reduce the likelihood they will be used. But it is not clear which countries still have CW

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<sup>21</sup> John A. Lauder, Special Assistant for Nonproliferation to the Director of Central Intelligence, unclassified “Statement to the Commission to Assess the Organization of the Federal Government to Combat the Proliferation of Weapons of Mass Destruction,” as prepared for delivery on 29 April 1999, p. 4.

<sup>22</sup> Milton Leitenberg, “An Assessment of the Threat of the Use of Biological Weapons or Biological Agents,” September 18, 2000, paper prepared for the Conference on Biosecurity and Bioterrorism, Istituto Diplomatico Mario Toscano, Rome, Italy, p. 18.

<sup>23</sup> Ibid.

programs because the Convention has not been aggressively implemented and there have been no challenge inspections.<sup>24</sup> Several countries that ratified the CWC have probably terminated their CW programs, but it is suspected that some signatories (such as Iran and Sudan) and several countries that have not signed the CWC (Egypt, Israel, North Korea, and Syria) may still be developing or producing CW.

Technology and materials for the production of lethal chemical agents are available internationally, and production facilities can be concealed, so it is possible that additional countries and subnational groups may now, or soon, have CW capabilities. In 1995, the Japanese religious cult Aum Shinrikyo launched attacks in the Tokyo subway with sarin, a chemical nerve agent. Producers of small quantities of CW could multiply, but restrictions established under the CWC are expected to limit large-scale production and stockpiles among CWC states parties.<sup>25</sup> The extent to which the worldwide CW threat decreases or increases in the coming decade depends in part on how effectively the CWC is implemented.

Chemical agents can be delivered by aircraft, drones, artillery, rocket launchers, submunitions on cruise or ballistic missiles, dispersion from a chemical reaction or manual or mechanical release. All but three of the countries that reportedly have had or have sought chemical weapons also have missiles and other means of delivery. Several countries reportedly have CW warheads for their missiles.

## Missile Arsenals and Programs

Nearly all countries that reportedly have or are seeking nuclear, biological, or chemical weapons also have ballistic missiles — four do not (Cuba, Sudan, Myanmar, Thailand).<sup>26</sup> About 15 other countries have ballistic missile programs but no known WMD capability.<sup>27</sup> The five established nuclear powers have intercontinental ballistic missiles or submarine launched ballistic missiles. North Korea tested a Taep' o-dong 1 with a third stage (as a space launch vehicle) in 1998, demonstrating a potential ICBM capability.<sup>28</sup> In the late 1980s, Saudi Arabia bought

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<sup>24</sup> Jonathan B. Tucker, "The Chemical Weapons Convention: Has it Enhanced U.S. Security?" *Arms Control Today*, April 2001, pp. 8-12.

<sup>25</sup> CRS Report RL32158, *Chemical Weapons Convention: Issues for Congress*.

<sup>26</sup> The ballistic missiles referred to in this paper are guided during a portion of their ascent, then follow a ballistic (unguided and unpowered) trajectory over the remainder of the flight. Cruise missiles are continually powered by an air-breathing or rocket engine and are generally guided for their entire flight. Excluded are all air-to-air, surface-to-air, antitank, anti-ship, and air-to-surface missiles, unguided artillery rockets, and satellite launch vehicles.

<sup>27</sup> Countries with ballistic missiles but no known NBC weapons are: Afghanistan, Argentina, Armenia, Belarus, Bulgaria, Czech Republic, Greece, Netherlands, Romania, Slovakia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, and Yemen. For further discussion of the missiles held by each country, see CRS Report RL30427, *Missile Survey: Ballistic and Cruise Missiles of Foreign Countries*.

<sup>28</sup> The CIA estimated in 2001 that if North Korea can make the third stage function properly, (continued...)

medium-range ballistic missiles (MRBM — 1000-3000 km) from China. Israel, India, Pakistan, and Iran have MRBMs and may be working to develop intermediate range ballistic missiles (3000-5500 km) and, perhaps eventually ICBMs with ranges over 5500 km.<sup>29</sup> At least 25 other countries have short-range ballistic missiles with ranges under 1000 km. For the last five years, North Korea has been the primary exporter of missiles and missile technology, but firms in Russia and China continue to help foreign programs. Organizations in those two countries have supplied material, components, and technical assistance to Iran, India, Libya, Pakistan, Syria, and even North Korea.<sup>30</sup>

Cruise missiles are more widely distributed. About 80 countries possess them, and 18 countries can manufacture them. Most of these missiles are procured for anti-ship missions and have ranges below the Missile Technology Control Regime (MTCR) 300-km threshold. Russia, Ukraine and France have long-range, sophisticated cruise missiles capable of carrying nuclear weapons. The UK purchased Tomahawk cruise missiles and is jointly producing the Apache cruise missile with France. Germany, and possibly China, are developing cruise missiles at the MTCR limit, and the UK and Italy are developing missiles with ranges below that.

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<sup>28</sup> (...continued)

and if it has a reentry vehicle to protect a warhead, it might be able to deliver a small payload to ICBM range. See CIA, Unclassified Summary, *National Intelligence Estimate of Foreign Missile Development and Ballistic Missile Threats through 2015*, December 2001, (hereafter *Unclassified NIE Ballistic Missile Threat*).

<sup>29</sup> Israel produces the Jericho 1 short-range ballistic missile (SRBM) and Jericho 2 MRBM and is developing the Jericho 3 which various reports describe as an intermediate-range ballistic missile (IRBM) or an ICBM. Israel also produces space launch vehicles that could be converted to ballistic missiles, possibly ICBMs. India has developed and tested the Agni MRBM and space launch vehicles. Pakistan's Ghauri and Iran's Shahab 3 are both MRBMs based on North Korea's Nodong. Both those countries are developing longer range missiles. See CRS Report RL30427, *Missile Survey*.

<sup>30</sup> CIA, *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Weapons, 1 July through 31 December 2001* (hereafter CIA, *WMD/ACM Dec 2001*); and "Russia Sells Missile Technology to North Korea," *Washington Times*, June 30, 2000.

**Table 1. The State of Proliferation**

	<b>Nuclear* Weapons Capability</b>	<b>Biological Weapons Capability</b>	<b>Chemical Weapons Capability</b>	<b>Ballistic Missiles (Longest)</b>	<b>Cruise Missiles</b>
<b>Algeria</b>	— <sup>a</sup>	Research?	Suspected	SRBM	Anti-ship
<b>China</b>	NWS	Likely <sup>b</sup>	Has Had	ICBM	Produce Anti-ship
<b>Cuba</b>	—	Reported	—	—	Anti-ship
<b>Egypt</b>	Ended	Known R&D	Likely	SRBM	Anti-ship
<b>France</b>	NWS	Ended	Ended	SLBM	Produce Variety
<b>India</b>	Stockpile <sup>c</sup>	—	Has Had <sup>d</sup>	MRBM	Produce Variety
<b>Indonesia</b>	—	—	Sought	—	Anti-ship
<b>Iran</b>	Seeking	Likely	Has Had <sup>e</sup>	MRBM	Produce Anti-ship
<b>Iraq</b>	Ended	Ended <sup>f</sup>	Ended <sup>f</sup>	SRBM	Produce Variety?
<b>Israel</b>	Stockpile <sup>g</sup>	Likely R&D	Likely	MRBM	Produce Variety
<b>Kazakhstan</b>	Ended (Soviet)	—	Suspected <sup>h</sup>	SRBM	—
<b>Libya</b>	Ended	— -	Ended <sup>i</sup>	MRBM	Anti-ship
<b>Myanmar</b>	—	—	Suspected	—	—
<b>North Korea</b>	Seeking <sup>j</sup>	Likely	Known	IRBM	Produce Anti-ship
<b>Pakistan</b>	Stockpile <sup>k</sup>	— <sup>l</sup>	Likely	MRBM	Anti-ship
<b>Russia</b>	NWS	Suspected <sup>m</sup>	Known	ICBM	Produce Variety
<b>Saudi Arabia</b>	— <sup>n</sup>	—	Suspected <sup>o</sup>	MRBM	Anti-ship
<b>Serbia</b>	—	—	Known <sup>p</sup>		
<b>South Africa</b>	Ended	Ended	Suspected	Ended	Produce Anti-ship
<b>South Korea</b>	Ended	—	Suspected	SRBM	Anti-ship
<b>Sudan</b>	—	—	Suspected <sup>q</sup>	—	—
<b>Syria</b>	—	Seeking	Known	SRBM	Anti-ship
<b>Taiwan</b>	Ended	— <sup>r</sup>	Likely	SRBM	Produce Variety
<b>United Kingdom</b>	NWS	Ended	Ended	SLBM	Variety
<b>United States</b>	NWS	Ended	Known	ICBM	Produce Variety
<b>Vietnam</b>	—	—	Likely	SRBM	Anti-ship

\***Abbreviations:** NWS = declared nuclear weapon state; SRBM = short-range ballistic missile <1000 km-range; MRBM = 1001-3000 km; IRBM = 3001-5500 km; ICBM = > 5500 km-range; SLBM = Submarine Launched Ballistic Missile

**Notes to Table 1:**

a. In the early 1990s, a few indicators suggested a clandestine nuclear program using the 15 MWt Es Salam reactor at Ain Oussera and small-scale reprocessing capability. Algeria joined the NPT in 1995, signed a comprehensive safeguards agreement in 1996 and began IAEA inspections in 1997. China has provided technical assistance. Joseph Cirincione, with Jon Wolfsthal and Miriam Rajkumar, *Deadly Arsenals*, Carnegie Endowment for International Peace, 2002, pp.299 ff.

b. ACDA reported in its 1997 compliance report to Congress that China previously had a biological weapon (BW) program and that it was highly probable that China remained noncompliant with

obligations under the BW Convention. DoD stated that "...China may retain elements of its biological warfare program." Department of Defense, *Proliferation: Threat and Response*, January 2001, p. 15 (hereafter *PTR 2001*).

c. India detonated a nuclear device in 1974 and claimed to detonate 5 nuclear devices in 1998 with varying yields. Estimates of its nuclear weapons stockpile vary widely, from 35 (*Bulletin of Atomic Scientists*, March/April 2002, Vol. 58, No. 2, pp. 70-72) to 100.

d. When it became a state party to the Chemical Weapons Convention, India admitted that it had produced a chemical weapons stockpile, but has since hosted all required CWC inspections. It retains the capability to produce CW. *PRT 2001*, p. 25.

e. Iran used chemical weapons in 1987 during the Iran-Iraq War and also supplied Libya with chemical weapons which were later used in Chad. *PTR 1997*, pp. 15-16. "It is also believed to be conducting research on nerve agents." *PTR 2001*, p. 36.

f. Iraq claimed it destroyed its CW and BW stockpiles and none have yet been found. Iraq used CW against Iran and against its own Kurdish population in the 1980s.

g. Although press reports and the academic community generally report that Israel has about 200 nuclear weapons (including thermonuclear weapons), many of which could be deployed with its missile force, neither the Israeli nor U.S. government has officially acknowledged their existence.

h. Kazakhstan reportedly retained some Soviet-era CW stockpiles.

i. Libya used Iranian-supplied chemical weapons in Chad. Libya declared to the OPCW on March 5, 2004 that it had produced 23 tons of mustard gas at Rabat between 1980 and 1990 and stored those materials at 2 sites. Libya also declared thousands of unfilled munitions.

j. Before North Korea pulled out of the NPT, it was widely believed that North Korea had produced enough plutonium for between one and two weapons. After pulling out of the NPT in April 2003, North Korea made several statements that it had reprocessed all the spent fuel rods in storage at Yongbyon, which could contain enough plutonium for about 6 more weapons.

k. Pakistan detonated several nuclear devices in May 1998. Its stockpile is estimated to be between 30 and 50 weapons. *Bulletin of Atomic Scientists*, January/ February 2002, Vol 58, No. 1, pp 70-71.

l. Pakistan is believed to have the resources and capabilities to support a limited biological warfare research and development effort," *PTR 2001*, p. 28.

m. Russia acknowledged it had a clandestine BW program and claims to have stopped production. However, the U.S. is not assured that Russia is in compliance with the Biological Weapons Convention.

n. There are reports of Saudi interest in funding the Pakistani nuclear programs and reports of visits by Saudis to Pakistani nuclear facilities. See Shahram Chubin, "Eliminating Weapons of Mass Destruction: The Persian Gulf Case," The Henry L. Stimson Center, March 1997, p. 20; "Saudi Arabia: Weapons of Mass Destruction Capabilities and Programs," Center for Nonproliferation Studies, Monterey Institute of International Studies; *New York Times*, July 10, 1999; *Reuters*, August 3, 1999; *New York Times*, August 7, 1994.

o. There are unconfirmed reports that Saudi Arabia may have developed chemical warheads for its CSS-2 missiles. NBC Capabilities, Saudi Arabia, *Jane's NBC Defense Systems 1998-1999*. Also, *Defense and Foreign Affairs Weekly*, April 1991, reported Chinese assistance to Saudi Arabia in developing chemical warheads. Also, in the *Arms Control Reporter* as of March 13, 1991 and May 1992, 704.E-0.10.

p. In April 2000, the former Yugoslavia agreed to adhere to the CWC. For information on its former stocks, see [<http://www.globalsecurity.org/wmd/world/serbia/cw.htm>].



q. Sudan “may be interested in a biological weapons program as well.” “Sudan, a party to the CWC, has been developing the capability to produce chemical weapons for many years. It historically has obtained help from foreign entities, principally in Iraq.” Director of Central Intelligence, *WMD/ACM Dec 2001*.

r. The United States believes that Taiwan had been upgrading its biotechnology capabilities, but the “evidence indicating a BW program is not sufficient to determine if Taiwan is engaged in activities prohibited by the BWC.” ACDA, *Adherence to and Compliance with Arms Control Agreements: 1997, Annual Report to Congress*.

## Trends Regarding NBC Weapons and Missiles

Despite increasingly available technology, states are not driven inexorably toward acquiring NBC weapons and missiles, as is apparent in Table 1 (page 12). Political and economic trends can yield incentives or disincentives for states (and, perhaps, terrorist organizations) to develop, maintain, or abandon NBC weapon or missile capabilities. Some developments in the last ten to fifteen years that have helped shape the international environment for nonproliferation are listed below. Table 2 shows membership in international control regimes.

### Developments

The risk of a massive exchange of nuclear weapons, and of massive biological or chemical attacks, has decreased in the last decade. The reduction of nuclear weapons under START and the Moscow Treaty, continuing unilateral reductions, and improved safeguarding of nuclear weapons and materials continue to decrease the risk of nuclear war in Europe and North America, an accidental launch, and the proliferation of nuclear weapons.

But, Russia has thousands of nuclear weapons, a military doctrine that calls for the use of nuclear weapons to prevent defeat on the battlefield, and large stockpiles of nuclear, chemical, and biological weapons material. Several Russian organizations have provided WMD technology to Iran, North Korea, and other potentially hostile countries. Russian scientists reportedly have aided other states’ WMD programs.<sup>31</sup>

States adopted export controls and joined and strengthened multilateral control regimes in the 1990s in the areas of nuclear weapons, missile technology, and chemical weapons. Some developments were:

- Indefinite extension of the NPT in 1995 and 1998 Additional Protocol for strengthened nuclear safeguards.
- Comprehensive Test Ban Treaty was signed by many countries and may reduce the likelihood that some additional countries will develop, test, and deploy nuclear weapons.
- MTCR created (1987), and strengthened and expanded (1993) to control missile technology.

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<sup>31</sup> Tenet, “Post-9/11 Threat,” p.13.

- Chemical Weapons Convention entered into force (1997), decreasing the likelihood of large-scale CW production and use.

But, the future of multilateral arms control appears dim, with no plans for the United States to approve ratification of the CTBT, no plans to create a workable verification protocol under the BWC and no movement forward in fissile material production cutoff negotiations.

China joined the NPT and NSG, ratified the CWC, stopped nuclear tests, halted fissile material production, and signed the CTBT. It also agreed not to export complete missiles controlled by the MTCR guidelines (Category I).

But, China is modernizing its nuclear missile force (though its size is not expected to approach that of the United States or Russia); maintains CW and possibly BW stocks and provides missile technology to Iran, Pakistan, North Korea, and Syria; and adopts a threatening posture toward Taiwan.<sup>32</sup>

North Korea continues to abide by a missile flight test moratorium, offered to abandon ICBM development in exchange for satellite launch services, and continues to participate in negotiations (six-party talks).

But, North Korea expelled IAEA inspectors in 2002, withdrew from the NPT in 2003, has been pursuing clandestine uranium enrichment and reportedly has restarted its plutonium production, including reprocessing spent fuel rods containing enough plutonium for 6 weapons. It remains unpredictable, has frequently been belligerent, and is armed with CW, BW, missiles, and, likely, nuclear weapons.<sup>33</sup>

The number of nuclear weapons, biological weapons and chemical weapons appears to be declining,

But, roughly half of the countries with NBC weapon and missile programs are in the Middle East. The fragile political and security environment there makes arms control highly desirable but nearly impossible. A second tier of missile producers are outside the MTCR, and a nuclear black market appears to be thriving.

Pakistan and India have renewed talks aimed at reducing tensions in South Asia and ending conflict in Kashmir. These include nuclear confidence-building measures and talks on terrorism.

But, South Asia remains a hotspot for WMD proliferation and terrorism. Both India and Pakistan are building medium range missiles, and both probably have chemical weapons. There is still no settlement of the Kashmir conflict. According

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<sup>32</sup> See *PTR 2001*, p. 14.

<sup>33</sup> U.S. National Intelligence Council, CIA. *Global Trends 2015: A Dialogue About the Future with Nongovernment Experts*. NIC 2000-02, December 2000, p. 36. South Korea's Defense White Paper issued in December 2000 found no change in the North Korean military threat.

to one observer, the “potential for miscalculation is frightening.”<sup>34</sup> Pakistani nuclear scientists sold nuclear weapons technology to Libya, Iran, and North Korea for several years.

The United States has established several venues for better cooperation with allies on controlling the transfer of sensitive technologies, particularly to combat terrorist access. These include the G-8 Global Partnership, the Proliferation Security Initiative, and passage of UN Security Resolution 1540.

But, terrorists are apparently interested in all WMD including attempting to acquire chemical weapons and possibly biological and radiological weapons.

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<sup>34</sup> Vice Admiral Thomas R. Wilson, Director, Defense Intelligence Agency, Statement for the Record, “Global Threats and Challenges.”(hereafter “Global Threats and Challenges”) Senate Select Committee on Intelligence, February 6, 2002, p. 7.

**Table 2. International Commitments**

	NPT	CWC	BWC	CTBT	NSG	MTCR	IAEA safeguards
<b>Algeria</b>	R	R	R	R	—	—	All
<b>China</b>	R	R	R	S	P	Pledged	Some*
<b>Cuba</b>	R	R	R	—	—	—	Some
<b>Egypt</b>	R	—	S	S	—	—	All
<b>Ethiopia</b>	R	R	R	S	—	—	All
<b>France</b>	R	R	R	R	P	P	Some*
<b>India</b>	—	R	R	—	—	—	Some
<b>Indonesia</b>	R	R	R	S	—	—	All
<b>Iran</b>	R	R	R	S	—	—	All
<b>Iraq</b>	R	—	R	—	—	—	All
<b>Israel</b>	—	S	—	S	—	Adherent	Some
<b>Kazakhstan</b>	R	R	—	R	—	—	All
<b>Libya</b>	R	R	R	R	—	—	All
<b>Myanmar (Burma)</b>	R	S	S	S	—	—	All
<b>North Korea</b>	— (withdrew)	—	R	—	—	—	All
<b>Pakistan</b>	—	R	R	—	—	—	Some
<b>Russia</b>	R	R	R	R	P	P	Some*
<b>Saudi Arabia</b>	R	R	R	—	—	—	—
<b>South Africa</b>	R	R	R	R	P	P	All
<b>South Korea</b>	R	R	R	R	P	P	All
<b>Sudan</b>	R	R	R	R	—	—	All
<b>Syria</b>	R	—	S	—	—	—	All
<b>Taiwan</b>	—	—	R	—	—	—	Some**
<b>Thailand</b>	R	R	R	S	—	—	All
<b>United Kingdom</b>	R	R	R	R	P	P	Some*
<b>United States</b>	R	R	R	S	P	P	Some*
<b>Vietnam</b>	R	R	R	S	—	—	All
<b>Yugoslavia (Serbia &amp; Montenegro)</b>	R	R	R	R	—	—	All

**Sources:** International Atomic Energy Agency [<http://www.iaea.org/Publications/Documents/Treaties/npt.html>]; [<http://www.opbw.org>] [<http://www.opcw.org>] [<http://www.ctbto.org>].

**Notes:** \* The 5 nuclear weapon states have voluntary inspections at some, but not all facilities.

\*\* The IAEA applies safeguards to the nuclear facilities in Taiwan, but recognizes the PRC as the only government to represent China.

#### **Abbreviations in Table 2**

NPT - Nuclear Non-Proliferation Treaty; CWC - Chemical Weapons Convention; BWC - Biological Weapons Convention; CTBT - Comprehensive Test Ban Treaty; NSG - Nuclear Suppliers Group; MTCR - Missile Technology Control Regime; IAEA safeguards- Inspections of facilities under an agreement with the International Atomic Energy Agency.

#### **Key to Table 2**

P - Participant; R- Ratified or acceded; S - Signed but not yet ratified  
 Pledged - Unilaterally agreed not to export missiles that meet MTCR thresholds  
 Adherent- Entered an international agreement with the U.S. to abide by MTCR

## **Proliferation and Risk of Use**

Several factors appear to facilitate the spread of dangerous technology to additional countries and groups. These same factors also might increase the likelihood that NBC weapons will be used (either militarily or for blackmail):

- Technological developments (in NBC, computer, and production technology)
- Increasingly free flow of information, people and goods
- Growing disparities in conventional military capabilities
- Growing disparities in strategic defenses
- Continued prestige of nuclear power
- Growing prestige of missile capabilities
- Perceived utility of NBC threats to deter U.S. intervention, and
- Perceived disdain by major powers for certain arms control agreements and international cooperation on nonproliferation.

Threat assessments are highly debated exercises and necessarily subjective because they must assess not only technical capabilities (quantity and quality of weapons and control thereof) but also the intentions of the state or group that possesses the weapons (including options and thresholds for use). The connection between the existence of the technology or weapon and risk of use is not always clear. One school of thought is that the risk of use is directly proportional to the size of stockpiles or diffusion of technology or material. An opposing view is that the weapons themselves are manageable on a case-by-case basis.<sup>35</sup> In general terms, the reduction of global and regional tension helps reduce the perceived need for weapons of mass destruction. Economic and political integration are also thought to reduce incentives for proliferation. The strong and credible U.S. deterrent capability might weaken the likelihood that some hostile countries will acquire or use WMD.

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<sup>35</sup> These debates rarely occur about other military equipment because the norms against use are not so clearly defined. However, the norms against missile use (conventionally armed) and chemical weapons appear to have eroded slightly in the Middle East. See *Missile Survey*, CRS Report RL30427. On the other hand, Iraq did have missiles with biological and chemical warheads during the Gulf War and did not use them against the US. It is difficult to know what deterred Saddam Hussein, although some observers believe it was the veiled threat of nuclear use by President George H.W. Bush.

Analysts debate whether U.S. development of a National Missile Defense system would deter the proliferation and use of WMD or would incite further proliferation.

The NBC threat emanating from terrorist groups is even more complicated to assess. It is generally assumed that terrorist groups will find it easier to cross thresholds of NBC use than even some rogue states and that they will not adhere to traditional notions of deterrence. President Bush stated in a March 11, 2002 speech, “Some states that sponsor terror are seeking or already possess weapons of mass destruction; terrorist groups are hungry for these weapons, and would use them without a hint of conscience. And we know that these weapons, in the hands of terrorists, would unleash blackmail and genocide and chaos.”<sup>36</sup>

The strong connection between the further spread of NBC capabilities to states and potential availability of technology to terrorists is not new. In the *National Security Strategy for a New Century* (2000), the Clinton Administration noted that the “proliferation of advanced weapons and technologies threatens to provide rogue states, terrorists and international crime organizations with the means to inflict terrible damage on the United States, our allies, and U.S. citizens and troops abroad.” The U.S. Special Representative for Nuclear Nonproliferation remarked to the NPT Preparatory Committee that:

“The spread of nuclear weapons to additional states not only increases the risk of nuclear war among nations, but also increases the risk of nuclear terrorism. The nuclear weapon program of a proliferating state, from the design of a weapon to its assembly, offers new opportunities for exploitation by terrorists. New stockpiles of weapons-grade nuclear material present a tempting target. Nations seeking nuclear weapons who also harbor terrorists represent a particularly severe threat to the civilized world.”<sup>37</sup>

On the other hand, analysts debate whether rogue states (or, “axis of evil” states) themselves plan to use WMD against the United States. Most observers believe that North Korea and Iran are developing, or trying to develop, NBC weapons and longer-range missiles reportedly to deter U.S. intervention and to intimidate their neighbors. Some analysts doubt these countries would overtly attack the United States with WMD because of the U.S. ability to conduct an overwhelming counterattack. But others contend NBC weapons might be seen by these countries as useful to limit U.S. military options and as a weapon of last resort, particularly where regime survival is at stake. It is certainly not clear whether Saddam Hussein viewed his NBC programs as useful in limiting U.S. military options.

The United States government works hard to decrease the risk of WMD use, the spread of such weapons and capabilities, and the U.S. vulnerability to the weapons. U.S. leadership has been critical for the NPT, the IAEA, the Nuclear Suppliers Group, Zangger Committee, a fissile material production moratorium, the Chemical Weapons Convention, Australia Group, Missile Technology Control Regime,

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<sup>36</sup> See [<http://www.whitehouse.gov/news/releases/2002/03/20020311-1.html>].

<sup>37</sup> Ambassador Norman A. Wulf’s statement to the preparatory committee of the NPT Review Conference, New York, April 8, 2002.

Wassenaar Arrangement, START I, II, and III, North Korea Agreed Framework, and bilateral efforts with numerous countries to discourage the spread of weapons technology and the acquisition, deployment, or use of WMD. But various constituencies have criticized some recent U.S. actions for what they see as stimulating WMD proliferation: policies such as the development of a national missile defense; potential development of new nuclear weapons; withdrawing from the Anti-Ballistic Missile Treaty; discussions of regional missile defense systems in Asia and the Middle East; and refusal to consent to ratification of the Comprehensive Test Ban Treaty. Some critics are concerned that broader nonproliferation objectives will fall prey to shorter term goals in the war on terrorism.<sup>38</sup> Abroad, observers have expressed concern that the United States is abandoning its arms control and nonproliferation leadership and that the U.S. emphasis on freedom of action will translate into other states seeking the same (e.g., Russia), to the detriment of the international nonproliferation regime.<sup>39</sup>

Missile defense advocates argue that a defensive posture is less threatening than the strategy of nuclear deterrence and vulnerability (mutual assured destruction) that marked the Cold War approach. Proponents also argue that missile defense strengthens deterrence and “keeps rogue states from being able to blackmail the United States, its friends or allies by threatening a missile attack.” Additionally, they note that missile defense weakens the incentive to develop, test, produce and deploy missiles by states like Iran and North Korea.<sup>40</sup>

## Trends in Nuclear Weapons

The total number of nuclear warheads in the world will continue to decline over the next few decades as the United States and Russia reduce their stockpiles, even as the number of nations with nuclear weapons may increase. The nuclear inventories of China, India, and Pakistan are small, but all will probably be expanded. There is no indication that Israel will significantly increase or decrease its alleged nuclear arsenal in the near future. North Korea’s nuclear weapons stockpile has probably grown in the last year, and efforts continue to conduct negotiations to halt that program. The further acquisition of sensitive materials and technology by Iran must be halted.

Director of Defense Intelligence Vice Admiral Thomas R. Wilson predicted:

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<sup>38</sup> See Leonard Weiss, “The Nexus of Counterterrorism and Nonproliferation Policy,” *Monitor*, Winter 2002, Vol. 8, No. 1, pp. 3-7.

<sup>39</sup> Remarks by Therese Delpech, Director, Strategic Affairs, French Atomic Energy Commission, at Wilson Center forum, April 16, 2002. See also Jayantha Dhanapala, “Arms Control and Multilateralism: The Problem of Political Will,” presentation to Tenth Annual International Arms Control Conference — Conundrums in Arms Control: The New Millennium,” Albuquerque, New Mexico, April 14-16, 2000, is available online at [<http://disarmament.un.org:8080/speech/statements.htm>].

<sup>40</sup> Fact Sheet: U.S. State Department on U.S. Nonproliferation Efforts, September 7, 2001. [<http://usinfo.state.gov>]

We will continue to face strategic nuclear threats — from Russia and China, and eventually from North Korea and other ‘rogue’ states. While the total number of warheads targeted against us will be much lower than during the Cold War, the mix of threat nations, force structures, capabilities, and employment doctrines will complicate the strategic threat picture. ...

Several rogue states will likely acquire nuclear weapons during the next decade or so, and some existing nuclear states will undoubtedly increase their inventories. As these trends unfold, the prospects for limited nuclear weapons use in a regional conflict will rise. So too will the potential for a terrorist or some other subnational group to acquire and use a weapon.<sup>41</sup>

Even though Russia will probably continue to reduce its strategic forces below START II levels because of financial constraints, it will maintain its ability for the foreseeable future to strike the United States with thousands of warheads. Unclassified U.S. projections of Russia’s strategic deterrent for 2015 all fall below 2000 deployed nuclear warheads.<sup>42</sup> Russia’s strategic forces are designed to deter nuclear and conventional aggression, but Russia “is prepared to conduct limited nuclear strikes” to repel an enemy or change the course of battle. An unauthorized or accidental nuclear launch of a Russian strategic missile is deemed highly unlikely.<sup>43</sup>

China plans to improve its strategic nuclear force by developing new mobile ICBMs, possibly with multiple reentry vehicles carrying nuclear warheads, and upgraded command, control, and communications. Its small strategic deterrent force is expected to improve significantly in numbers (to several tens of missiles), accuracy, reliability, and survivability in the next 20 years.<sup>44</sup> According to a DoD report, China is concentrating on building its political, diplomatic, and economic power for achieving its national goals and considers its nuclear weapons primarily a deterrent. But, “If a third party were to intervene militarily in a regional conflict involving China, the PLA would employ all means necessary in the hope of inflicting high casualties and weakening the intervening party’s resolve.”<sup>45</sup> The National Intelligence Council judged in 1999 that “an unauthorized launch of a Chinese strategic missile is highly unlikely.”<sup>46</sup> China is also expanding and modernizing its

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<sup>41</sup> Vice Admiral Thomas R. Wilson, Director, Defense Intelligence Agency, “Military Threats and Security Challenges Through 2015.” (hereafter “Military Threats”) Statement before the Senate Select Committee on Intelligence, February 2, 2000, pp. 6, 10.

<sup>42</sup> *Unclassified NIE Ballistic Missile Threat*, 2001, pp. 8 and 9. DIA estimated 1500 warheads by 2010.

<sup>43</sup> *Ibid.*

<sup>44</sup> Wilson, “Military Threats,” p. 14.

<sup>45</sup> U.S. Department of Defense. “Annual Report to Congress on the Military Power of the People’s Republic of China,” June 22, 2000, pp. 2 and 7.

<sup>46</sup> *Global Trends: 2015*, 1999 edition, p. 9.



tactical missile forces, which are likely armed with conventional warheads although they are capable of delivering NBC warheads.<sup>47</sup>

India and Pakistan intensified their nuclear rivalry with tests of nuclear weapons and MRBMs in 1998, and both began to establish doctrine, tactics, and contingency plans for the use of nuclear weapons. The two countries “narrowly averted a full-scale war in Kashmir [in 1999], which could have escalated to the nuclear level.”<sup>48</sup> While the nuclear competition between India and Pakistan is dangerous, most analysts conclude India’s quest for nuclear weapons is driven primarily by its desire for the status of a major power and by its regional competition with China. In the fall of 2001, however, riots in Pakistan coupled with reports of senior Pakistani nuclear scientist ties to the Taliban and rumored U.S. efforts to gain assurances about the security of Pakistani nuclear weapons all contributed to growing concern about the safety and security of the Pakistani nuclear arsenal. In May and June of 2002, the increasingly tense military deployments along the Line of Control in Kashmir raised the specter of a conventional crisis spiraling out of control and sparking a nuclear exchange. Nonetheless, Pakistani and Indian leaders initiated talks at the end of 2003 designed to enhance confidence in several areas, including terrorism and nuclear weapons.

## Risks of Nuclear Conflict

The risk of nuclear weapons use can be roughly estimated using such factors as:

- the existence of nuclear weapons and delivery systems in various countries
- information on the readiness of those weapons for use (weaponization, deployment, alert status)
- evidence indicating that the conditions for using nuclear weapons in a country’s strategy and doctrine were close to being met
- the level of conflict between a nuclear-armed state and its adversary(ies)
- the level of frustration with a long confrontation that was inflicting heavy casualties, draining national resources and patience, and challenging the leader’s credibility, even if not threatening national integrity.

It is possible that as more countries acquire nuclear weapons or expand their nuclear arsenals, the likelihood they will use nuclear weapons will increase. The acquisition of nuclear weapons by countries with inadequate command and control systems, vague strategic doctrine (or aggressive operational doctrine), and poor

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<sup>47</sup> Bill Gertz, “Missiles Bolstered Opposite Taiwan,” *Washington Times*, April 29, 2002. According to the article, China had fewer than 50 SRBMs on bases near Taiwan in 1996 and now has more than 350. The additional missiles were reported to be CSS-6 Mod 2s.

<sup>48</sup> George Tenet, Director of Central Intelligence, “The Worldwide Threat in 2000: Global Realities of Our National Security,” Testimony before the Senate Select Committee on Intelligence, February 2, 2000, pp. 3, 5, and 37.

intelligence on enemy capabilities and intentions could particularly increase the risk of nuclear warfare.

**Table 3** highlights some key events since the development of nuclear weapons that analysts use to assess the risk of nuclear warfare. Many national security analysts agree that the risk of nuclear warfare rose in the early 1950s and probably peaked during the Cuban Missile Crisis. Tensions remained relatively high through the 1960s, leading to a high risk of Sino-Soviet confrontation in 1969. The early 1980s saw renewed risk of US-USSR nuclear warfare, but that risk declined precipitously with Gorbachev's opening of the USSR. With the addition of new, de facto nuclear weapon states, new risks have emerged in the Middle East, South Asia, and on the Korean Peninsula. The clash in Kargil and ongoing Indian and Pakistani tensions probably present the greatest risk of nuclear war since the end of the Cold War.

Several European and Canadian defense experts expressed the view in 2000 that the threat of nuclear war has diminished substantially over the past decade and their feeling of safety has increased.<sup>49</sup> Views that the threat has diminished may reflect the probability that a future nuclear war is more likely to occur in Asia or the Middle East.

Although the nuclear arsenals of China, India, and Pakistan are now considered primarily to be deterrent forces, some analysts are concerned these countries may be adopting doctrine calling for the tactical use of nuclear weapons under dire circumstances in regional conflicts. Others worry that the very existence of nuclear weapons in the arsenals of antagonist countries raises the probability of nuclear war through miscalculation or desperation, if not in response to national doctrine. Other analysts contend the possession of nuclear weapons by one country in a conflict is likely to deter other countries from using their own nuclear weapons or, generally, attempting to conquer the nuclear-armed country.<sup>50</sup> The tense situation along the Line of Control in Kashmir has generated significant media coverage about what might trigger a nuclear war in South Asia.<sup>51</sup>

In addition, the fact that a future nuclear attack may consist of a small number of detonations rather than a catastrophic exchange of hundreds or thousands of nuclear warheads may lead some to feel the threat is reduced. Other observers regard any developments that make nuclear weapons more usable (i.e., smaller yields, less radiation fallout, or tailored for specific missions) as potentially destabilizing. This perspective underlined much of the recent criticism of leaks surrounding the new

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<sup>49</sup> *The Ottawa Citizen*, August 25, 2000, cited in the *Ballistic Missile Defense Organization External Affairs Digest*, August 31, 2000; Carnegie Endowment for International Peace, "Why U.S. Allies Do Not See a Missile Threat," September 21, 2000.

<sup>50</sup> For further discussion of deterrence, see CRS Report RL30623, *Nuclear Weapons and Ballistic Missile Proliferation in India and Pakistan*; and "Israel's Nuclear History," *Jane's Intelligence Review*, July 2000, p. 14. See also Rodney Jones, "Minimum Nuclear Deterrence Postures in South Asia: An Overview," Final Report, October 1, 2001, prepared for the Defense Threat Reduction Agency.

<sup>51</sup> See CRS Report RS21237, *Indian and Pakistani Nuclear Weapons Status*.

U.S. Nuclear Posture Review. A resumption of nuclear testing would probably also be viewed by observers in that camp as destabilizing.

**Table 3: Key Nuclear-Relevant Events**

	<b>Strategic Conflict</b>	<b>Strategic Cooperation</b>	<b>Regional conflict</b>	<b>Regional Cooperation</b>
1940s	45: Hiroshima, Nagasaki 48: East Europe under USSR 49: USSR atomic test			
1950s	50-53: Korean War 53: Russian H bomb test; US tactical nukes to Europe 56: Hungary uprising		54/5: Formosa Crisis 56: Mideast war	
1960s	61: Berlin 62: Cuban Missile Crisis 63: Berlin 68: Prague spring	63: Hotline	62: Indo-China border war 64: China Nuclear test 65: Indo-Pakistani conflict 68: Tet offensive 69: Sino-Soviet border clash	63: Limited Test Ban Treaty 67: Treaty of Tlatelolco signed (banning nuclear weapons in Latin America) 68: NPT signed
1970s	77: SS-20s deployed 79: USSR invades Afghanistan	71: Risk Reduction Measures* 72: ABM Treaty 73: Prevention of Nuclear War 74: Nuclear Suppliers' Group	73: Mideast War 74: Indian Atomic Test	72: Hotline between military commanders of India & Pakistan
1980s	81: Martial law in Poland 83: Pershing-2s deployed KAL007 shot down	85/6: Gorbachev 87: INF Treaty 88: Ballistic missile launch notification 89: Berlin wall falls	80-8: Iran-Iraq War 87: Operation Brass Tacks (India, Pakistan)	89: Hotline established between prime ministers of India & Pakistan
1990s		90: Germany reunified 91: Nunn-Lugar program begun 93: START II signed	91: Gulf War 92: N. Korea crisis begins 98: India, Pak test nuclear devices 98: NK, Pak, India, Iran test missiles 99: Kargil	91: India & Pakistan agree to not attack each other's nuclear facilities; regular use of a hotline; pre-notification of troop movements. 94: Agreed Framework w/ NKOREA 99: Lahore Agreement (India-Pakistan)
2000s		02: Strategic arms reduction agreement between US & Russia	01: Kashmir 02: Kashmir; India and Pakistan test missiles	00: Talks between North and South Korea 02: India affirms no-first-use of nuclear weapons

\* = Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between US and USSR

## Trends in Biological and Chemical Weapons

The entry into force of the Chemical Weapons Convention and establishment of the Organization for the Prevention of Chemical Weapons reduced international transfers of weapons materials and equipment and brought about the destruction of CW stocks. Several countries that were thought to have CW have joined the Convention and accepted the requirement to destroy their CW stockpiles. The probability of large-scale CW attack could decline as these stocks are destroyed, especially if restrictions on CW development and trade are enforced. And yet, chemical weapons remain in the arsenals of some aggressive countries — and possibly some terrorist groups — and trade in CW ingredients continues.

The negotiating members of the Biological Weapons Convention developed a draft protocol to establish measures to verify the legitimate activities of biotechnology plants around the world. But the United States found the safeguards insufficient and too intrusive. The covert development of biological weapons, especially in non-member states, remains hard to detect; the use of BW is hard to defend against; and a BW attack could cause enormous casualties or destruction of crops. International trade in BW material, equipment, and technology remains a concern. In the coming decades, as biotechnology makes further advances and international flows of information, people, and goods continue to grow, the threat of BW warfare may also increase.

Director of the Defense Intelligence Agency (DIA), Vice Admiral Wilson noted biological and chemical weapons are relatively easy to develop, hide, and deploy and said, “I expect these weapons to be widely proliferated, and they could be used in a regional conflict over the next 15 years. I am also concerned that sub-national groups or individuals will use chemical or biological agents in a terrorist or insurgent operation.”<sup>52</sup> In 1999, the General Accounting Office criticized the Clinton Administration for not having developed a comprehensive assessment of the domestic and international threat of CW and BW attacks by terrorists. It reported that, even without sophisticated knowledge or dissemination methods, terrorists could attack with toxic industrial chemicals such as chlorine. But, GAO judged,

terrorists would need a relatively high sophistication to successfully cause mass casualties with some other chemical and most biological agents. Specialized knowledge would be needed to acquire the right biological agent or precursor chemicals, process the chemical or biological agent, improvise a weapon or device, and effectively disseminate the agent to cause mass casualties.<sup>53</sup>

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<sup>52</sup> Wilson, “Military Threats,” p. 10.

<sup>53</sup> General Accounting Office, *Combating Terrorism: Need for Comprehensive Threat and Risk Assessments of Chemical and Biological Attacks*, GAO/NSIAD-99-163, September 1999, pp. 2-3.

As Jonathan Tucker noted, the fact that large cities are quite vulnerable to terrorist CW and BW attacks does not demonstrate an existing threat from such terrorist attacks.<sup>54</sup>

The Central Intelligence Agency has identified several dangerous trends:<sup>55</sup>

- Developments in biotechnology, including genetic engineering, may produce a wide variety of live agents and toxins that are difficult to detect and counter; and new CW agents and mixtures of CW and BW agents are being developed.
- Some countries, such as Iran, are becoming self-sufficient in producing CW and BW agents and less dependent on imports.
- Countries are using the natural overlap between weapons and civilian applications of chemical and biological materials to conceal CW and BW production; controlling exports of dual-use technology is ever more difficult.
- Countries with CW and BW capabilities are acquiring sophisticated delivery systems including cruise and ballistic missiles.
- Scientists with experience in CW and BW production continue to leave countries of the former Soviet Union.
- About one dozen terrorist groups have sought CW, BW, and nuclear material or expressed interest in them; several countries with CW and BW capabilities have sponsored terrorists.

## Trends in Missiles

There are conflicting trends in the area of missile threats to the United States and U.S. interests — several developments tend to alleviate concern but several others cause concern. On the positive side:

- The Missile Technology Control Regime (MTCR) has added many new partners, growing from 7 to 33. In 1993 it added a catch-all clause. China and Israel agreed to abide by some MTCR guidelines.
- In 2002, 92 countries signed an International Code of Conduct to control missile trade.

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<sup>54</sup> Jonathan B. Tucker, *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, Monterey Institute of International Studies, Cambridge, Massachusetts, MIT Press, 2000, p. 1.

<sup>55</sup> John A. Lauder, Special Assistant for Nonproliferation to the Director of Central Intelligence, "Unclassified Statement to the Commission to Assess the Organization of the Federal Government to Combat the Proliferation of Weapons of Mass Destruction," as prepared for delivery on April 29, 1999, pp. 4-5.

- Since September 1999, North Korea has suspended long-range missile tests. In July 2000, media reported Kim Jong-Il suggesting North Korea would abandon its long-range missile program in exchange for international assistance in launching North Korean satellites.<sup>56</sup> Despite a deterioration in U.S.-North Korean relations on nuclear issues, North Korea has adhered to the missile test moratorium.
- The United States signed a memorandum of understanding with Israel strengthening the U.S. commitment to help against WMD and long range missile attacks, to enhance Israeli defensive and deterrent capabilities, and to upgrade bilateral military and technological cooperation.
- The United States successfully tested its National Missile Defense, Theater High Altitude Area Defense, and Patriot PAC-3 although it also had several unsuccessful tests. Israel and Taiwan also tested theater missile defense systems.

Several other developments in the area of missile proliferation were more ominous:

- In August 1998, North Korea tested a three-stage space launch vehicle/missile that demonstrated the potential to deliver a small warhead over 5,000 km; it tested rocket engine motors in mid-2001. North Korea exported missiles and production technology for Scud-variants, including the Nodong, a single-stage MRBM. Buyers included Iran, Pakistan, Egypt, Syria, Vietnam, and Libya. Iran and Pakistan each tested medium-range ballistic missiles reportedly based on the Nodong and both are developing longer range missiles.
- In April 1999, South Korea tested a missile believed to be capable of traveling 300 km or more, contravening a 1972 US-South Korean agreement that Seoul would not build missiles with a range greater than 180 km. The US negotiated a new agreement, under which Seoul can build missiles up to the MTCR threshold (300 km range, 500 kg. warhead). South Korea also plans to build satellite launch vehicles and a launch facility.
- India announced its intention to produce the Agni MRBM, test fired an Agni II which is to have a range of between 2,000 and 3,000 km, and is developing longer range missiles.
- Numerous Russian firms and institutions have reportedly supplied missile technology to foreign countries including Iran and North Korea. Russia test fired several of its existing missiles and deployed

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<sup>56</sup> *Washington Post*, July 20, 2000.

a second regiment of Topol-M intercontinental range ballistic missiles (ICBM)s.

- China remains formally outside the MTCR. According to the CIA, China has supplied additional missile technology to Pakistan, Iran, North Korea, Libya, and other countries. It also appears to have deployed as many as 350 SRBMs to areas near the Taiwan Strait, continues to threaten Taiwan, and test-fired a new mobile strategic missile, the DF-31.<sup>57</sup>
- Taiwan is reportedly considering an offensive missile force to deter and counter China's missiles.
- A French-British firm let a contract to the United Arab Emirates for Black Shahine land attack cruise missiles (although no technology has yet been transferred) and the US sold ATACMs to Bahrain.

There is a range of views on the gravity of the missile threat to the United States. Secretary of Defense Donald Rumsfeld stated in June 2001 that "The number of ballistic missiles, and the number of countries possessing them, is growing as well. The existence of this threat is not debatable. It is real."<sup>58</sup> Lieutenant General Ronald Kadish, Director of the Missile Defense Agency, stated in March 2004 that "Ballistic missiles armed with any type warhead would give our adversaries the capability to threaten or inflict catastrophic damage."<sup>59</sup>

At the other end of the spectrum are critics such as Joseph Cirincione, of the Carnegie Endowment for International Peace, who argues that there are "many fewer ballistic missiles in the world than 15 years ago, fewer nations trying to develop them, and only four potentially hostile nations trying to develop long-range versions."<sup>60</sup> He noted that "China is the only potentially hostile nation with both ballistic missiles that can reach the United States and the nuclear warheads to put on them."

The devil is in the details of how threats are estimated and whether one focuses just on long-range ballistic missiles or ballistic and cruise missiles of all ranges.<sup>61</sup>

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<sup>57</sup> Bill Gertz, "Missiles Bolstered Opposite Taiwan," *Washington Times*, April 29, 2002.

<sup>58</sup> Donald Rumsfeld, Secretary of Defense, "Toward 21<sup>st</sup> Century Deterrence," *Wall Street Journal*, June 27, 2001.

<sup>59</sup> Lt. Gen. Ronald T. Kadish, testimony before the House Armed Services Committee, Subcommittee on Strategic Forces, March 25, 2004.

<sup>60</sup> Joseph Cirincione, "A Much Less Explosive Trend," *Washington Post*, March 10, 2002, p. B3.

<sup>61</sup> DCI Tenet, in the question and answer session of hearing before the Senate Armed Services Committee on March 19, 2002 on the Worldwide Threat, stated that "one thing that's the wild card in all of this all the time in these estimates is the pace of technology and the pace of foreign assistance [which] continually surprise us." March 19, 2002. Tenet (continued...)



The CIA's National Intelligence Council's 2001 unclassified summary of a national intelligence estimate on foreign missile threats, mandated by Congress, stated that "before 2015 the United States most likely will face ICBM threats from North Korea and Iran, and possibly from Iraq, — barring significant changes in their political orientations — in addition to the longstanding missile forces of Russia and China. One agency assesses that the United States is unlikely to face an ICBM threat from Iran before 2015."<sup>62</sup> It elaborated that North Korea could convert its Taep'o-dong 1 space launch vehicle into an ICBM capable of reaching parts of the United States with a light CW/BW payload and could test the more powerful Taep'o-dong 2 at any time (rather than within five years as often stated in the press) which could deliver a large payload anywhere in the United States. Although the DPRK continued to observe its flight testing moratorium, the intelligence community assumed development had continued."<sup>63</sup> Iran was said to be able to build an ICBM with Russian help and test it between 2005 and 2010, or it could build a Taep'o-dong type ICBM, possibly with North Korean help in the next few years.<sup>64</sup>

Some analysts have questioned the sophistication of North Korea's missile program and the likely progress in Iran's missile program.<sup>65</sup> In particular, the Carnegie Endowment's Cirincione took issue with the Rumsfeld report's assertion that new nations could deploy ICBMs with little or no warning, calling it "somewhat hysterical."<sup>66</sup> The great emphasis on the long-range missile threat and efforts to defend against that potential threat, in the view of some analysts, detracts from the more likely threats to U.S. security posed by terrorists armed with WMD, by foreign ships in U.S. ports, or by short-range ballistic or cruise missiles launched from ships

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<sup>61</sup> (...continued)

suggested, however, that in the ballistic missile area, "things happen a lot faster than estimates sometimes predict."

<sup>62</sup> *Unclassified NIE Ballistic Missile Threat*, 2001, p. 4.

<sup>63</sup> *Ibid.*, p. 11. A 1999 estimate noted that North Korea would require an operable third stage and a survivable reentry vehicle, which had not yet been observed, to produce an ICBM. The 2001 estimate is more optimistic, noting that a two-stage Taepo Dong-2 would be able to strike some parts of the continental US with a small payload. The Commission to Assess the Ballistic Missile Threat to the United States (Rumsfeld Commission) concluded North Korea and Iran could "inflict major destruction on the U.S. within about five years of a decision to acquire such a [ballistic missile] capability (10 years in the case of Iraq)." Many interpreted that statement to indicate the threat would materialize in 2004, but North Korea could have made the decision some years ago and be much closer to the capability. The Clinton Administration subsequently reported it would not be able to deploy a national missile defense before 2005 and that became the target date for meeting a developing North Korean threat even though Pyongyang tested the Taep'o-dong 1 in August 1998 and was expected to test the Taep'o-dong 2 in 1999 or 2000.

<sup>64</sup> *Ibid.*, p. 8

<sup>65</sup> For example, engine failures have plagued test launches of the Iranian Shahab-3, most recently in January 2002.

<sup>66</sup> "The Ballistic Missile Threat Evolves," by Joseph Cirincione, Carnegie Endowment for International Peace, Non-Proliferation Project Issue Brief, vol. II, no. 13, Sept. 10, 1999. Comments on the 1999 intelligence estimate and on the report of the Commission to Assess the Ballistic Missile Threat to the United States.

stationed off the U.S. coasts. Prior to September 11<sup>th</sup>, the intelligence community found the threat of shipborne missile attack to be remote, and former Secretary of Defense Cohen noted, “To say that we can’t protect against everything [e.g., all possible terrorist attacks] doesn’t mean that we shouldn’t protect against those that can cause us catastrophic harm.”<sup>67</sup>

There is less controversy over the threat of missiles that can attack U.S. forces overseas and U.S. allies. Over the past few years, the number of countries with short range ballistic missiles (SRBMs) has grown — Scud missiles and basic missile production technology are widely available. A 2002 U.S. intelligence community assessment stated that “the probability that a missile with a weapon of mass destruction will be used against *US forces or interests* is higher today than during most of the Cold War, and will continue to grow as the capabilities of potential adversaries mature.”<sup>68</sup>

Another concern is the improvements and new designs being made by China, North Korea, Iran, Syria, India, and Pakistan. These countries are improving the range and accuracy of their missiles. Technologies to watch for include stage separation, multiple warheads, submunitions, improved guidance, and penetration aids.

North Korea has about 500 Scuds and 100 Nodong missiles and has exported hundreds of missiles to the Middle East.<sup>69</sup> Israel, India, and North Korea have developed multistage missiles, a key step in building intercontinental missiles. Pakistan and Iran may soon test two or three stage missiles. Vice Admiral Wilson said that he expects “the number of ballistic missiles with ranges between 500 and 3,000 kilometers to increase significantly during the next 15 years and to become more accurate and destructive. Likewise, the potential for widespread proliferation of land attack cruise missiles is high. ... Major air and sea ports, logistics bases and facilities, troop concentrations, and fixed communications nodes will be increasingly at risk.”<sup>70</sup> The Director of Central Intelligence has further noted that the new medium-range missiles are “significantly altering strategic balances in the Middle East and Asia.”<sup>71</sup>

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<sup>67</sup> “U.S. Study Reopens Division Over Nuclear Missile Threat,” *New York Times*, July 5, 2000, p.1.

<sup>68</sup> Robert Walpole, CIA. March 11, 2002 Statement for the Record before the Senate Government Affairs Committee. The assessment further noted, however, that U.S. *territory* is more likely to be attacked with chemical, biological, radiological and nuclear materials from nonmissile delivery means — most likely by terrorists. This is because, according to the assessment, “nonmissile delivery means are less costly, easier to acquire, and more reliable and accurate.”

<sup>69</sup> General Thomas Schwartz, U.S. Army, Commander of United Nations Command and ROK/U.S. Combined Forces Command, Testimony before the Senate Armed Services Committee, March 7, 2000.

<sup>70</sup> Wilson, “Military Threats.” p. 11.

<sup>71</sup> George Tenet, Director of Central Intelligence, “The Worldwide Threat in 2000: Global (continued...) ”

Another dangerous trend is the spread of production technology, as North Korea, China, and various groups in Russia have helped other countries design, test, and produce their own missiles. With their help, Pakistan and Iran test fired medium-range ballistic missiles in April and July 1998 respectively. The Russian and Chinese governments have promised to restrict missile technology exports, but it is not yet clear they will be able to do so or are committed to the effort. While North Korea is voluntarily abstaining from missile flight tests, it has not agreed to limit missile developments, deployments, or exports. Even Iran, Libya, and Egypt have been identified as sources of missiles or some missile production technology.

In the case of cruise missiles, production technology is even more widespread. Of the 81 countries possessing such missiles, only 18 now produce them, but 22 additional countries have emerging manufacturing capabilities.<sup>72</sup> Many production technologies, like sensors and flight controls, are becoming or are already available commercially. Satellite-assisted guidance technology (Global Positioning System) has improved accuracy. The widespread use of unmanned aerial vehicles in the war on terrorism in Afghanistan has been hailed by some as the coming of age of remotely piloted vehicle technology. While much of the technology associated with cruise missiles is controlled under MTCR guidelines, the sophistication of what is available commercially is growing by leaps and bounds.

## Prospects and Assessments

As the potential scale of NBC warfare declines, the number of countries or groups that could initiate a nuclear, biological, or chemical attack may be rising. The number of countries with missiles is increasing, and countries have frequently used missiles in combat or as a tool of intimidation. The zone of particular concern spreads from North Africa across the Middle East, through South Asia to Northeast Asia. Within this band of countries, Israel, India, Pakistan, and China reportedly have nuclear weapons and are working to improve their warheads and delivery systems. North Korea may have nuclear weapons and Iran, Iraq, and Libya are said to be trying to develop nuclear weapons. Chemical weapon and missile development programs are rife in this zone, and several of the countries are reportedly developing biological weapons.

According to DIA Director Wilson, “New alliances have formed, providing pooled resources for developing these capabilities, while technological advances and global economic conditions have made it easier to transfer materiel and expertise.”<sup>73</sup> Russia supplies Iran with civilian nuclear, biological, and chemical technologies that enhance Iran’s weapons programs. In the past, China has supplied nuclear weapons

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<sup>71</sup> (...continued)

Realities of Our National Security,” Testimony before the Senate Select Committee on Intelligence, February 2, 2000, p. 5.

<sup>72</sup> Christopher Bolkcom, Statement before the Senate Governmental Affairs Committee, Subcommittee on International Security, Proliferation, and Federal Services, June 11, 2002, p. 18.

<sup>73</sup> Wilson, “Global Threats and Challenges.” p. 7.

technology to Pakistan and CW production equipment to Iran but has apparently improved its export control policies in recent years.<sup>74</sup> North Korea, China, and Russia continue to be primary suppliers of missile technology. Some countries in the Middle East have acquired the means to produce and develop missiles and are potential or actual suppliers to less advanced countries. According to former DCI Tenet, “it’s important to focus on the totality of what’s going on, it’s the combination of the Russian assistance, the Chinese assistance, the North Korean assistance that allows people to mix and match, create an indigenous capability that then threatens us that becomes available for secondary proliferation.”<sup>75</sup>

Five years ago, a former head of CIA’s Nonproliferation Center concluded that the United States and its allies were not on top of the NBC proliferation problem, “We are not even staying even. We are slipping.”<sup>76</sup> Two years ago, Vice Admiral Wilson reported to Congress that “All told, the prospects of limiting proliferation are slim, and the global WMD threat to US-allied territory, interests, forces, and facilities will increase significantly.”<sup>77</sup> In February 2002, Vice Admiral Wilson told the Senate Select Committee on Intelligence that “The rapid pace of technology development is creating more, and more exposed, technological vulnerabilities in advanced states. Meanwhile, the globalization of technology and information — especially regarding WMD and advanced conventional weapons — will increasingly accord smaller states, groups, and individuals access to destructive capabilities previously limited to major world powers. Massive destructive technologies in the hands of ‘evil doers’ is my worst fear.”<sup>78</sup>

Most observers readily agree that nonproliferation policies aim to slow WMD programs until states are persuaded that WMD are not in their national security interest. Bush Administration officials have called the mix of arms control and nonproliferation regimes, export controls and diplomatic overtures “passive measures to stem proliferation” and called for more aggressive actions to expose, sanction, and prosecute proliferators, middlemen, and weapons brokers.<sup>79</sup> Regardless of whether the threat of terrorist acquisition of WMD materializes, additional attention to the problem of proliferation may help buy time for effective policies to work.

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<sup>74</sup> CIA, *WMD/ACM* 1999, pp. 9 and 10.

<sup>75</sup> DCI Tenet statement during question and answer session of Senate Armed Services Committee hearing on the Worldwide Threat, March 19, 2002.

<sup>76</sup> Oehler, Gordon C. *Conference on Countering Chemical and Biological Weapons: The Threat*. Jane’s Information Group, Nov. 19, 1997.

<sup>77</sup> Wilson, “Military Threats.” p. 10.

<sup>78</sup> Wilson, “Global Threats and Challenges.” pp. 10-11.

<sup>79</sup> John R. Bolton, “Beyond the Axis of Evil.”