

Briefing Paper on the Status of Biological Weapons Nonproliferation

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The anthrax attacks of 2001—which killed five people, sickened over a dozen others, and terrorized the country—have brought the threat of biological weapons to the fore of America’s conscience.

Since then, U.S. government leaders have pursued a number of measures to respond to this threat. For example, President George W. Bush signed legislation in June 2002 to improve the ability of emergency personnel and the medical community to react to a biological weapons attack. Washington and other Western capitals have also invigorated cooperative efforts to guard against the spread of biological weapons-related technology and expertise from the old Soviet germ warfare program. Furthermore, the United States and other members of a body known as the Australia Group concluded new measures to bolster their national export controls on biological weapons-related goods and technology in June 2002.¹

Although these efforts are praiseworthy, the Bush administration has so far failed to tackle the most fundamental problem facing the international biological nonproliferation regime: the need to strengthen the Biological Weapons Convention (BWC), which outlaws germ weapons and underpins all nonproliferation efforts in this area.

Germ Weapons and the BWC

Biological warfare agents can be living microorganisms that cause disease, or they can be toxins, which are nonliving poisons produced by living organisms or synthesized versions of such poisons. Given specialized know-how and resources, these agents can be fashioned into weapons that are designed to kill or harm. However, many experts believe that only sophisticated, state-sponsored biological weapons



Members of Australia’s Tactical Assault Group on the day of the unit’s launch, September 5, 2002. The group is responsible for responding to biological, as well as any chemical, radiological, nuclear, or explosive incidents.

programs can overcome the significant technical challenges involved in “weaponizing” biological agents so that they can threaten large numbers of people. Unlike many other weapons, biological weapons typically take two days or more to affect their victims, and contagious agents can spread beyond the population initially infected.²

Although biological weapons are highly dangerous, their actual use in war and in terrorist attacks has been relatively rare. In 1925, the international community concluded the Geneva Protocol, agreeing to prohibit the use of germ weapons in war, and countries have employed biological arms on only a few occasions since the protocol’s conclusion.³ Nevertheless, several states, including the United States and the Soviet Union, maintained active biological weapons programs for decades after the protocol was signed.

But by 1969, the United States renounced all methods of biological warfare and said it would eliminate its arsenal. Washington also moved to support an international ban on the development and possession of biological arms, asserting that biological weapons posed a significant risk to unprotected civilian populations and were not useful on the battlefield. Presenting Washington’s argument for such a treaty in 1970, Ambassador James Leonard said that biological weapons were “unpredictable” by nature, could not destroy enemy military equipment, and would not affect enemy troops “for days.” The United States also concluded that germ weapons had limited deterrent value because responding in kind to a biological weapons attack would not be “acceptable or rational.”⁴

Leading treaty talks in the United Nations, the United States and the Soviet Union worked out a draft treaty that other countries eventually endorsed, and the Biological Weapons Convention opened for signature in April 1972. Asserting that biological weapons use “would be repugnant to the conscience of mankind and that no effort should be spared to minimize this risk,” the treaty forbids its 144 member states from developing, retaining, and transferring these weapons. The BWC does not explicitly ban the use of biological weapons; instead, it references the prohibition in

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the Geneva Protocol. The treaty permits biodefense programs.

To enforce its provisions, the convention specifies that its members can lodge a complaint with the UN Security Council if they believe other states-parties are violating the convention, and the council can then call for an investigation of complaints it receives. However, council voting rules give China, France, Russia, the United Kingdom, and the United States veto power over all council decisions. The investigations mechanism has not been used to date, and even if it had, the treaty does not specify what information or access the state being investigated is obligated to provide.

With no verification mechanisms available through the treaty, countries must rely on intelligence assessments to determine whether others are complying with the convention.⁵ Definitively making such determinations has proven difficult. The result has been a treaty that has successfully developed a norm prohibiting the development of biological weapons but that has been almost impossible to enforce—a situation that several countries have taken advantage of.

Soon after joining the BWC, the Soviet Union expanded its biological weapons program, violating the treaty with an enormous effort that dwarfed the former U.S. program. According to a senior Russian defector, by the late 1980s the Soviet program employed about 60,000 personnel and was weaponizing devastating agents such as smallpox, which could cause thousands of deaths.⁶ In 1992, Russia said that it had terminated the Soviet program, but the United States still has doubts about Moscow's treaty compliance.

Iraq initiated a biological weapons program in 1973, despite signing the BWC a month after it opened for signature. Iraq ratified the treaty after the Persian Gulf War, but the United States has said that it is still violating the convention.

The United States has also accused North Korea of breaching the convention's terms and has expressed concern about the compliance of Iran, Libya, and Syria. Washington has also said that Cuba, a member

state, has at least a limited biological weapons research and development effort. In all, the Bush administration assesses that a minimum of 13 countries are currently pursuing biological weapons programs.

With treaty violations on record and too few effective ways to monitor compliance and legally enforce the BWC, the need to strengthen the convention is clear. Unfortunately, the Bush administration has effectively killed the most promising effort to date to address the treaty's shortcomings—a legally binding protocol to the treaty—and has only offered far less substantial, politically binding ideas as a replacement.

Attempts to Strengthen the BWC

Efforts to augment the BWC date back to 1986, when members decided that they should submit data to the United Nations on certain centers and laboratories that specialize in biological activities related to the convention. At a review conference in 1991, states-parties expanded the scope of these declarations. But states-parties were not legally obligated to make submissions, and the vast majority of states-parties have not participated in the endeavor, rendering it largely unsuccessful.

One year later, the United States, the United Kingdom, and Russia established a mechanism known as the "Trilateral Process" to address longstanding concerns over Russian compliance. In a joint statement signed in September of that year, Russia agreed to take steps to clear up the concerns, including allowing the United States and the United Kingdom to visit relevant nonmilitary sites in Russia. These visits took place in October 1993 and January 1994, and Russia conducted reciprocal visits to U.S. and British sites over the next few months. The process also envisioned visits to U.S. and Russian military sites, but talks subsequently broke down over the details; consequently, U.S. concerns about Russian compliance remained unresolved.

In 1994, BWC states-parties received a report from a group of governmental experts

that had been evaluating potential verification measures since 1991. The experts concluded that some verification measures could help improve the convention's implementation, and with these results in mind, states-parties authorized their most ambitious effort to date, establishing a body known as the Ad Hoc Group to conclude a legally binding protocol to strengthen the convention.

The Ad Hoc Group started meeting in 1995 and conducted negotiations for six-and-a-half years. As the negotiations wore on, a protocol emerged that addressed the Biological Weapons Convention's lack of verification procedures. The protocol required states to formally declare certain treaty-relevant activities and facilities, such as "maximum-containment" laboratories that are designed to keep biological agents from escaping. A new international agency would then follow up these declarations with visits to the declared facilities to increase "confidence" in the accuracy of declarations.

If countries had questions about other states' declarations, the protocol allowed them to ask the new body to look into the matter. The protocol also detailed a number of steps that states could take among themselves to consult on such issues. These procedures went far beyond anything that states had previously agreed to. In cases where a state suspected that another was cheating, it could ask the new implementing organization to conduct an investigation, and the protocol outlined the obligations of the inspected state.

No one thought that this regime of declarations, consultations, and investigations would be intrusive enough to identify illegal activity with complete certainty and therefore verify compliance with the treaty. But protocol supporters felt that by subjecting states' biological activities to some scrutiny, the protocol could deter countries from pursuing illegal biological programs or could at least seriously complicate such efforts.

One of the protocol's strongest points was that it backed up its measures with the force of international law. This was especially important given the failure of most states-parties to participate in the politically binding declaration process concluded in the 1980s. Because that initiative was not legally binding, little could be done to force uncooperative states to submit their declarations. The protocol, on the other hand, preserved states' ability to enforce its terms and those of the convention.

As the negotiations dragged on, a number of fundamental issues proved difficult to resolve, such as what facilities states should declare and what to do about

Western export controls, which many developing countries had objected to and wrapped into the negotiations. In March 2001, the Ad Hoc Group's chairman, Ambassador Tibor Tóth, issued a version of the protocol that attempted to strike a compromise on disputed issues.

At a July-August 2001 meeting of the Ad Hoc Group, the United States rejected Tóth's draft and any further protocol negotiations, to the dismay of the international community. The United States was the only country not willing to work with the draft, and because the negotiations operated by consensus, the U.S. refusal to consider the protocol blocked additional talks.

Explaining the U.S. objections to the chairman's draft, Ambassador Donald Mahley claimed that the protocol would not cover enough relevant facilities and that it would focus its energies on Western states instead of those countries thought to be pursuing biological weapons. As a result, the protocol would "do little" to deter states from violating the BWC.

Mahley also said that the protocol would not improve the United States' ability to verify others' compliance with the convention or enhance U.S. confidence that other states were complying. Because the number of biological facilities is vast and changes "on an irregular but frequent basis," the protocol would not produce "accurate, timely, or enduringly comprehensive" declarations and therefore would not successfully uncover illicit activity, Mahley asserted.

The ambassador further claimed that the protocol would not adequately protect the secrets of the U.S. biotech industry or U.S. biodefense programs. At a background briefing in Washington, a senior U.S. official added that the protocol would undermine the Australia Group.

Three months after the last Ad Hoc Group meeting, BWC members gathered in Geneva for their fifth treaty review conference. Many had hoped that the conference would serve as a venue to conclude the protocol. Instead, it had to sort out the mess left by the U.S. protocol rejection. At the conference, Washington tabled a number of new ideas to move forward—all of which were designed to be politically binding, not legally binding, commitments:

- Make it easier to extradite criminals involved in biological weapons crimes and require BWC member states to enact domestic legislation criminalizing treaty-prohibited activities. About half of the BWC's member states do not have such laws.

- Allow the UN secretary-general to investigate suspected biological weapons use and suspicious disease outbreaks.
- Elaborate vague BWC provisions for clarifying and resolving compliance concerns. This would involve voluntary exchanges of information or visits to sites in question.
- Support World Health Organization efforts to monitor and respond to global disease and establish an international team to provide assistance "in the event of a serious outbreak of infectious disease." States would also be required to "report internationally" releases of biological agents or other "adverse events that could impact other countries."
- Obligate states-parties to adopt and implement "strict regulations for access to particularly dangerous microorganisms." Related suggestions included calling on states to "sensitize scientists to the risks of genetic engineering," to "explore national oversight of high-risk experiments," to adopt a code of conduct for scientists working with pathogenic microorganisms, and to implement "strict biosafety procedures."

Other countries seemed amenable to working with Washington's ideas, but only if the Ad Hoc Group was left intact. However, on the conference's last day the U.S. delegation proposed terminating the Ad Hoc Group, an act that would effectively eliminate the group's mandate to conclude a legally binding protocol to the treaty.

Washington suggested that BWC member states instead meet annually in a new body to assess the implementation of any measures agreed to at the conference and to consider new measures for strengthening the convention. The idea caused an uproar, leading Tóth, the meeting's chairman, to suspend the conference for one year.

The review conference was scheduled to resume in November 2002, and the United States and United Kingdom proposed alternatives in the interim period. In September 2002, however, the United States distributed talking points to Western allies calling for a "very short" conference that would make no decisions beyond agreeing to meet for the next review conference in 2006. The United States indicated it would call explicitly for an end to the Ad Hoc Group's mandate if countries tried to discuss anything else.

Fortunately, the United States seemed to soften its position somewhat, and when the conference resumed, states-parties agreed to hold three annual meetings before the 2006 review conference. States did not discuss the contentious issue of verification measures to enforce the BWC, however, and the agenda for the annual meetings does not include ways to verify compliance.

In 2003, delegates will meet to discuss national mechanisms to implement oversight of biological agents and ensure that materials are secure, in addition to discussing national measures to implement the treaty's provisions, such as ensuring countries have laws to prosecute individuals who develop biological weapons. Experts' meetings are scheduled to be held in August and are to be followed by a political meeting.

In 2004, states-parties will consider ways to strengthen "international capabilities" to investigate and respond to alleged use of biological weapons and suspicious disease outbreaks. They will also discuss ways to enhance the ability of states and international organizations to detect, diagnose, and combat infectious diseases. In 2005, delegates will meet to consider standards for how scientists work with dangerous biological agents.

The decision to hold annual meetings before 2006 is better than nothing, but it falls far short of developing legally binding ways to help verify the treaty. States-parties did not directly discuss the Ad Hoc Group or the additional protocol in November, and the future of both is uncertain. The Ad Hoc Group appears to be dying a slow, quiet death.

Assessing U.S. Policy

Washington's rationale for rejecting the protocol is deeply flawed.

Mahley's assertion that the protocol would not have effectively deterred other countries from violating the convention overlooks the fact that it would have complicated countries' efforts to conduct illicit activity by making it harder to hide such work. It would have also provided a means by which the United States could have investigated its concerns. Without the protocol, there is no deterrent effect at all, and Washington has no effective way to look into suspected treaty violations.

Moreover, it is hard to believe that having international inspectors at suspected sites would not have augmented U.S. intelligence assessments. U.S. estimates of Iraqi weapons of mass destruction capabilities have drawn heavily from reports by UN

inspectors that operated on-site for over seven years. At the very least, the protocol would have provided Washington with more diplomatic options than it currently has. Simply threatening to launch an investigation could have applied pressure to help resolve a compliance concern.

Mahley's claim that the protocol would not help Washington verify compliance with the BWC is also unreasonable. The protocol was not designed to detect treaty violations with a high degree of certainty. Rather it was meant to expose countries' biological activities and thereby deter or complicate illegal activity. The United States appeared to recognize this point as late as September 2000, when Mahley testified before Congress:

This is not an issue of verification.... The United States has never, therefore, judged that the protocol would produce what is to us an effectively verifiable BWC. There is, however, real value in increasing the transparency associated with biological activity. What we have sought in the negotiations is greater transparency into the dual-capable activities and facilities

that could be misdirected for [biological weapons] purposes. This could, in our view, complicate the efforts of countries to cheat on their BWC obligations.

However, Mahley failed to make the same distinction when he announced the U.S. rejection of the protocol less than a year later. Instead, he applied a different standard—a standard that the protocol was not designed to meet.

Complaints about the protocol's impact on export control bodies are equally unjustified. The Bush administration argued that the protocol would allow countries to review each others' denials of requests to transfer agents or equipment, suggesting that such a review might be used to override national export controls. A U.S. General Accounting Office report released in September 2002, however, found that the draft protocol might actually have strengthened export controls. "Our review of the draft protocol shows that it required countries to establish export controls for dual-use items, included no provisions to eliminate such controls, and contained language that supported the efforts of the Australia Group and similar entities," the report says.

GAO investigators added that they found nothing in the draft protocol that "cited transfer denials or outlined procedures for overturning such denials."

Finally, the protocol took pains to meet U.S. demands to protect commercial and biodefense secrets. In fact, Tóth went overboard in the number of protections he provided, creating a protocol that should have been stronger in many areas. For instance, countries would not have had to declare all their treaty-relevant biodefense or commercial facilities, reducing the number of facilities that the inspectorate could have visited.

The mechanism to launch investigations of suspicious facilities was also weak. The treaty banning chemical weapons, the Chemical Weapons Convention, allows inspections of facilities to launch automatically, without the approval of the treaty's governing board. Tóth's draft would have required the approval of such a board before the inspectorate could have inspected a suspect facility, making the investigation more difficult to launch. Even if an inspection team were sent to a facility, the host country could have prevented the team from taking samples. The protocol included numerous other protections for inspection hosts during visits and investigations.

Global Biological Weapons Capabilities

Drawing on publicly available U.S. intelligence assessments (except where noted), the following chart details countries possessing or developing biological weapons, as well as countries that have legal biodefense programs or biotechnology infrastructure that suggest the ability to develop biological weapons. For those countries with weapons programs, the chart also lists stockpiles and potential delivery systems when possible.

Most of the states listed below have ballistic missile capabilities. However, ballistic missiles are only included as a potential biological weapons delivery system if U.S. intelligence reports have explicitly indicated that they could be used in such as capacity.

The chart also provides each country's membership status under the Biological Weapons Convention and the Geneva Protocol.

COUNTRY	BIOLOGICAL WEAPONS CAPABILITIES	TREATY STATUS
China	<p>Possibly maintains some elements of the offensive biological weapons program it had before joining the BWC. Infrastructure would allow it to develop, produce, and weaponize agents.</p> <p>Potential delivery systems include cruise missiles, fighters, bombers, helicopters, artillery, rockets, mortars, and sprayers.</p>	<p>Geneva Protocol: Acceded 8/24/29.</p> <p>BWC: Acceded 11/15/84.</p>
Cuba	<p>Has at least a limited biological weapons research and development effort.</p>	<p>Geneva Protocol: Acceded 6/24/66.</p> <p>BWC: Signed 4/12/72, ratified 4/21/76.</p>
Egypt	<p>Developed biological weapons agents by 1972, and there is no evidence suggesting it eliminated this capability.</p>	<p>Geneva Protocol: Signed 6/17/25, ratified 12/6/28.</p> <p>BWC: Signed 4/10/72.</p>
India	<p>Has a biodefense research program.⁸ Infrastructure suitable to research and develop pathogens.</p> <p>Potential delivery systems include short-range, anti-ship cruise missiles; short-range, air-launched tactical missiles; fighter aircraft; artillery; and rockets.</p>	<p>Geneva Protocol: Signed 6/17/25, ratified 4/9/30.</p> <p>BWC: Signed 1/15/73, ratified 7/15/74.</p>
Iran	<p>Has probably produced and weaponized biological agents. Production and weaponization capability likely limited.</p> <p>Potential delivery vehicles include short-range cruise missiles; short-range, air-launched tactical missiles; fighter aircraft; artillery shells; and rockets.</p>	<p>Geneva Protocol: Acceded 11/5/29.</p> <p>BWC: Signed 4/10/72, ratified 8/22/73.</p>
Iraq	<p>Possesses "an active and capable" biological weapons program, according to CIA Director George Tenet.</p> <p>Declared in 1995 that it had produced approximately 30,000 liters of bulk biological agents or filled munitions, including anthrax, botulinum toxins, and aflatoxins. Also admitted it had filled missile warheads and aerial bombs with agent and had deployed biological munitions during the Persian Gulf War.</p> <p>The United Nations believes Iraq had produced three to four times more agent or munitions than it declared. Iraq is also thought to have conducted research on other agents and toxins.</p>	<p>Geneva Protocol: Acceded 9/8/31.</p> <p>BWC: Signed 5/11/72, ratified 6/19/91.</p>

COUNTRY	BIOLOGICAL WEAPONS CAPABILITIES	TREATY STATUS
Iraq <i>(continued from previous page)</i>	<p>Questions remain about the scope of Iraq's program and what parts of the program Iraq has destroyed or currently retains. The United States strongly suspects Iraq has reconstituted its program since UN inspectors left Iraq in 1998 and is concerned that Baghdad is producing agents. Could be improving its agent research and development capabilities.</p> <p>Means of delivery may include short-range, anti-ship cruise missiles; ballistic missiles; short-range, air-launched tactical missiles; fighter aircraft; helicopters; artillery; rockets; and unmanned aerial vehicles.</p>	
Israel	Possibly has a biological weapons research effort. ⁹	<p>Geneva Protocol: Acceded 2/20/69.</p> <p>BWC: Has not signed.</p>
Libya	<p>Has a research and development program and may be able to produce small amounts of agent. Likely in need of foreign assistance to advance program further.</p> <p>Potential delivery vehicles include short-range, anti-ship cruise missiles; air-launched tactical missiles; fighter aircraft; bombers; artillery; helicopters; and rockets.</p>	<p>Geneva Protocol: Acceded 12/29/71.</p> <p>BWC: Acceded 1/19/82.</p>
North Korea	<p>Has developed and produced and may have weaponized biological agents. May have biological weapons available for use.</p> <p>Potential means of delivery include short-range, anti-ship cruise missiles; bombers; rockets; mortars; sprayers; artillery; helicopters; and fighters.</p>	<p>Geneva Protocol: Acceded 1/4/89.</p> <p>BWC: Acceded 3/13/87.</p>
Pakistan	<p>Has ability to support limited biological weapons research and development effort.</p> <p>Potential delivery vehicles include short-range, anti-ship cruise missiles; short-range, air-launched tactical missiles; fighter aircraft; artillery; and rockets.</p>	<p>Geneva Protocol: Signed 4/15/60.</p> <p>BWC: Signed 4/10/72, ratified 9/25/74.</p>
Russia	<p>Despite having ratified the BWC in 1975, the Soviet Union maintained a large biological weapons effort. Russia publicly acknowledged this program in 1992 and said it had been halted.</p> <p>Agents weaponized included tularemia, typhus, Q fever, smallpox, plague, anthrax, Venezuelan equine encephalitis, glanders, brucellosis, and Marburg. Researched numerous other agents and toxins that can attack humans, plants, and livestock.¹⁰</p> <p>Currently has a defensive research program. Some elements of the Soviet program may remain intact and could help support agent and delivery vehicle production. The United States has received unconfirmed reports of continued offensive activities.</p> <p>Washington has serious concerns about the status of the weapons program inherited from the Soviet Union and remaining weapons capabilities. In April 2002, the Bush administration notified Moscow that it could not certify that Russia was complying with the BWC.</p> <p>Potential delivery vehicles include fighter aircraft, artillery, rockets, helicopters, short-range ballistic missiles, and cruise missiles. The former Soviet program planned to deliver certain agents, such as smallpox, anthrax, and plague, by ICBM.</p>	<p>Geneva Protocol: Acceded 4/5/28.</p> <p>BWC: Signed 4/10/72, ratified 3/26/75.</p>
Sudan	May be interested in developing a biological weapons program.	<p>Geneva Protocol: Acceded 12/17/80.</p> <p>BWC: Has not signed.</p>

COUNTRY	BIOLOGICAL WEAPONS CAPABILITIES	TREATY STATUS
Syria	<p>Has a biological weapons program in the research and development stage and may be capable of producing a small amount of agent. No major weaponization effort is likely underway. Cannot manufacture significant amounts of weapons without major foreign assistance.</p> <p>Potential delivery vehicles include fighter aircraft; helicopters; artillery; short-range, anti-ship cruise missiles; short-range, air-launched tactical missiles; and rockets.</p>	<p>Geneva Protocol: Acceded 12/17/68.</p> <p>BWC: Signed 4/14/72.</p>
Taiwan	<p>Has upgraded its biotechnology capabilities, but whether it is conducting illicit activities has not been determined.</p>	<p>BWC: Has pledged to adhere to the treaty's terms.</p>
United States	<p>Unilaterally gave up its biological weapons program in 1969. Currently conducting research as part of its biodefense program that some say may violate the BWC.</p>	<p>Geneva Protocol: Signed 6/17/25, ratified 4/10/75.</p> <p>BWC: Signed 4/10/72, ratified 3/26/75.</p>

Sources: Department of Defense, State Department, Central Intelligence Agency, Arms Control and Disarmament Agency, U.S. Army.

NOTES

1. The 34 members of the group meet annually to coordinate their export control policies on items that importers could use in chemical or biological weapons programs.
2. Jonathan B. Tucker, "Introduction," in Jonathan B. Tucker, ed., *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, (Cambridge, Massachusetts: MIT Press), 1999, p. 4.
3. Monterey Institute of International Studies, "Chronology of State Use and Biological and Chemical Weapons Control," <http://cns.miis.edu/research/cbw/pastuse.htm>
4. Statement by Ambassador James Leonard to the UN Conference of the Committee on Disarmament, March 17, 1970.
5. In the 1980s, the UN Security Council and General Assembly granted the UN secretary-general the power to conduct investigations of alleged biological, toxin, or chemical weapons use, which is banned by the Geneva Protocol. Since the BWC bans the development and retention of biological and toxin weapons and makes reference to the Geneva Protocol, a ban on use is implicit in the BWC. Secretary-general investigations are therefore relevant to the BWC, but because the BWC focuses on the development and retention of biological weapons, not their use, these investigations really operate outside the BWC's parameters.

6. Martin I. Meltzer, *et al.*, "Modeling Potential Responses to Smallpox as a Bioterrorist Weapon," *Emerging Infectious Diseases*, November-December 2001, p. 963. Information on Soviet program taken from General Accounting Office, "Biological Weapons: Efforts to Reduce Former Soviet Threat Offers Benefits, Poses New Risks," April 2000, p. 7.
7. Jonathan B. Tucker, "In the Shadow of Anthrax: Strengthening the Biological Disarmament Regime," *The Nonproliferation Review*, Spring 2002, p. 114; Nicholas A. Sims, "The Case for a BWC Committee of Oversight: Draft Mandate and Commentary," *Disarmament Diplomacy*, September 2001, p. 13-14.
8. Although the Biological Weapons Convention prohibits offensive biological weapons, it permits biodefense activities.
9. Monterey Institute of International Studies, "Chemical and Biological Weapons: Possession and Programs Past and Present," <http://cns.miis.edu/research/cbw/possess.htm>.
10. Ken Alibek, testimony before the Joint Economic Committee, May 20, 1998; Ken Alibek, *Biohazard*, (New York: Random House, 1999). Before defecting in 1992, Ken Alibek was first deputy director of the Biopreparat, the civilian arm of the Soviet Union's biological weapons program.

For more information, please see the Arms Control Association's Web site, www.armscontrol.org.