

THE HENRY L. STIMSON CENTER

**Chemical Weapons
Disarmament in Russia:
Problems and Prospects**

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Pragmatic steps toward ideal objectives



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Contents

List of Tables.....	v
List of Figures.....	v
List of Abbreviations.....	vi
Introduction	
Michael Krepon.....	1
Improving the Security of Russia's Chemical Weapons Stockpile	
Amy E. Smithson.....	5
Dismantling the Soviet/Russian Chemical Weapons Complex:	
An Insider's View	
Dr. Vil S. Mirzayanov.....	21
Cooperative Threat Reduction Support to the Destruction of	
Russia's Chemical Weapons Stockpile	
Maj. Gen. Roland Lajoie, U.S. Army (Ret.).....	35
The United States, Russia, and Chemical Weapons Disarmament:	
Choices Ahead	
Amy E. Smithson.....	49
Appendix: Chronology of Events Related to U.S. and Soviet/Russian	
Chemical Weapons Disarmament	
Laurie H. Boulden.....	65
About the Project.....	75
About the Authors.....	77



List of Tables

Table 1: A Comparison of Physical Security at U.S. and Russian Chemical Weapons Facilities.....	13-14
Table 2: Mirzayanov’s Account of the Novichok Program.....	25
Table 3: Key Chemical Weapons Convention Destruction Milestones.....	39

List of Figures

Figure 1: Russian Chemical Weapons Storage Facilities.....	36
Figure 2: Key Russian Government Organizations Associated with Chemical Weapons Destruction.....	38
Figure 3: CTR Destruction Support Program.....	42

List of Abbreviations

BDA	Bilateral Destruction Agreement
CAL	Central Analytical Laboratory
CD	Conference on Disarmament
CTR	Cooperative Threat Reduction
CWC	Chemical Weapons Convention
CWDSO	Chemical Weapons Destruction Support Office
DNA	Defense Nuclear Agency
DOD	(U.S.) Department of Defense
FCS	(Russian) Federal Counterintelligence Service
GosNIIOKhT	(Soviet/Russian) State Scientific Research Institute of Organic Chemistry and Technology
MOD	(Russian) Ministry of Defense
MOU	Memorandum of Understanding
NATO	North Atlantic Treaty Organization
NIS	Newly Independent States
OPCW	Organization for the Prohibition of Chemical Weapons
OSIA	On-Site Inspection Agency
PAL	Permissive Action Link
WMD	Weapons of Mass Destruction

Introduction

Michael Krepon

A strange fate has befallen the Chemical Weapons Convention (CWC). Enmeshed in partisan wrangling between the executive and legislative branches, the CWC remains in limbo, both in Washington and Moscow. Hearings have been held and reports filed, but no votes have been taken in either country. In other words, the two countries most required for the CWC's successful entry into force have yet to ratify the accord.

With Moscow in a reactive mode, the task of prompting the CWC's ratification and successful implementation falls on Washington. If the Senate consents to the CWC's ratification, there is no assurance that the Duma will follow. If, however, the Senate fails to act, there is little incentive for the Duma to stretch from its defensive crouch.

As this collection of essays acknowledges, the decision before the Senate is not free of complication. The toughest questions are tackled directly in the pages that follow. Will Russian authorities be able to comply with treaty provisions even if they want to because of insufficient resources? What if Russian authorities do not want to comply fully with the CWC?

As Amy Smithson makes abundantly clear in her lead essay, Russian security for existing stocks is insufficient. Ms. Smithson observes that "Russia's chemical weapons storage sites appear to be vulnerable to theft from within and attack from without." Given the frightening example of the terrorist use of chemical weapons in Japan in March and April of 1995, she concludes that "The price of assisting Russia now is much lower than the cost that may be incurred later if this problem is not promptly addressed."

While many of the corrective measures advocated by Ms. Smithson are inexpensive and essential for the security of Russian citizens, even these small steps may be difficult for the Russian government to take. Moscow may be forced to split scarce rubles between improved security and destruction of the Russian stockpile, she notes, increasing the likelihood that progress will be slow and insufficient on both fronts. U.S. interests will best be served if these tasks are accomplished quickly and well.

Russian compliance with the CWC must be proven for it cannot be assumed. Yet Russia has no obligations to stop development of new chemical agents or to dismantle existing stocks without the CWC's entry into force. Those concerned with the possibility of Russian noncompliance need the investigative tools that the CWC provides. The advice of Russian whistleblower Dr. Vil S. Mirzayanov is especially important in this regard. "I now understand that the CWC provides the means to bring the Russian chemical weapons complex under international monitoring," he states. "If the CWC's procedures are not instituted, the Russian chemical weapons complex will remain accountable only to the same clique of leaders, who have thus far not proven their trustworthiness." Mirzayanov, a former employee of the Soviet chemical complex and prisoner of conscience for revealing chemical weapons-related activities, notes that Russians as well as Americans who wish for a complete accounting and halt to prohibited chemical weapons activities will be badly hurt by non-ratification.

In his essay, Mirzayanov describes what happened when he blew the whistle on the actions of Soviet authorities. He explains that "tens of tons" of new binary agents were produced in "experimental quantities," mostly for testing purposes. Mirzayanov states that the quantity involved "is not significant in the military sense."

It is also essential for the United States to provide more assistance to a Russia that has begun to take corrective measures to improve security around its chemical weapons and destroy its stockpile. The Russian government's efforts to initiate a destruction program have been frustrated by a lack of resources, public resistance and fear, and the absence of the legal and bureaucratic infrastructure to execute such a complicated program. As Maj. Gen. Roland Lajoie, (USA, Ret.) explains in his essay, the focus of U.S. assistance has been to "jump-start" Russia's efforts to destroy the nerve agents that comprise over 80 percent of Russia's stockpile.

"The objective of U.S. assistance," Lajoie states, "is not to achieve the complete destruction of the Russian chemical weapons stockpile—that goal is beyond the scope of the Cooperative Threat Reduction program both in terms of cost and time." With assistance from the United States and other countries at the outset, however, he argues that "Russia will be much better prepared to carry out destruction operations at the other storage facilities and continue down the path of CWC implementation."

Ms. Smithson's concluding essay makes a powerful case for the prompt ratification and entry into force of the CWC. The best way to help whistleblowers in the former Soviet Union and to advance U.S. national security is to pry open the old Soviet CW complex with the CWC's monitoring provisions. As Ms. Smithson notes, "Until the U.S. Senate gives its consent to ratification of the CWC, it will be in the untenable position of complaining about possible activities in Russia that may violate a law that does not exist. No matter how detailed a map Mirzayanov and other whistleblowers provide of the novichok program, without the CWC that map will be of little avail."

As for providing U.S. resources to improve security of the Russian stockpile and speed its destruction, Ms. Smithson quotes one of those she interviewed: "The best security is to get rid of it." Accordingly, she argues that "tightening security around Russia's chemical weapons stockpile and hastening its destruction will measurably reduce the possibility that Russian chemical weapons will one day harm Americans." Executive and legislative branch leaders within Russia and the United States are obligated to pay more attention to these pressing problems.

The international community has a choice: either to reinforce international norms against chemical weapons and establish an effective international agency to monitor the CWC or to let these opportunities pass and to live in a world without the CWC. As Ms. Smithson's notes in her analysis, "The CWC is best suited to help the United States reach its near-term objective to resolve problems in Russia and its long-range objectives regarding nonproliferation policy and chemical weapons disarmament."

The Stimson Center wishes to thank the authors of these essays for their time and effort. In addition, Maj. Gen. Lajoie's capable assistant Kevin Flamm was always helpful in providing information about the status of U.S. Cooperative Threat Reduction programming in Russia. Gale Colby dedicated a great deal of time and attention to Dr. Mirzayanov's discussion of the Soviet/Russian chemical weapons program. Those who worked with Ms. Smithson on her first

essay, including Congressman Glen Browder (D-Alabama) and other interviewees who requested anonymity, gave generously of their time and personal experience regarding chemical weapons security in Russia and the United States.

A number of individuals at the Stimson Center helped prepare this report. Senior Associate Joseph Cirincione furnished constructive suggestions and critical assessments. Laurie H. Boulden supplied indefatigable research assistance for the entire report and also managed to compile the chronology in the appendix. Sony Devabhaktuni, Jill Junnola, Howard Kee, Michele Siders, Kathleen Walsh, and Christine Wormuth helped proof the text. Laurie Boulden and Jane Dorsey deserve credit for its polished finish.

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Improving the Security of Russia's Chemical Weapons Stockpile

Amy E. Smithson

On March 20th, religious zealots in Japan broke a taboo against use of weapons of mass destruction by terrorists and, in the process, provided an ominous glimpse into future acts of terrorism. Contrary to most expectations and fears, the weapon of choice was not nuclear, but chemical. Twelve were killed and over 5,000 injured when the nerve gas sarin was released during the morning rush hour on Tokyo's crowded subway system.¹ Now that this line has been crossed, other terrorists and leaders of rogue states may try to follow in Aum Shinrikyo's path.

Moreover, U.S. policy makers need only recall the terrorists acts in New York City in 1991 and Oklahoma City in 1995 that stunned the whole world to face the ugly possibility that chemical terrorism could migrate to U.S. shores or even originate here. President Bill Clinton observed, "In light of what happened in Japan, all advanced countries should be very, very concerned about the prospect of the merger of terrorism with weapons of mass destruction."² For example, the effective use of chemical agents instead of conventional explosives in the 1991 terrorist attack against the World Trade Center would have totally devastated the building's occupants within a few moments.³

When the Soviet Union collapsed, much attention was given to the possibility that nuclear weapons or their components could find their way into the wrong hands. The frightening prospect of "loose nukes" prompted Senators Richard Lugar (R-Indiana) and Sam Nunn (D-Georgia) to launch a program to help Russia, Belarus, Ukraine, and Kazakhstan secure these weapons and begin safely dismantling their delivery vehicles according to treaty requirements. The Cooperative Threat Reduction (CTR) program got off to a slow start because umbrella agreements had to be negotiated with the former Soviet states and the Defense Department had to award contracts to U.S. companies to provide the appropriate goods and services.⁴ However, there is widespread

¹ Nicholas D. Kristof, "Hundreds in Japan Hunt Gas Attackers After 8 Die: Police Tighten Security Steps at Stations," *New York Times*, 21 March 1995, A1; Lois Ember, "Tokyo Subway Attack: Chemical Weapon Possible Terrorist Tool," *Chemical & Engineering News* (27 March 1995): 6-7; "Gas Attacks Renew Fears For Japanese," *Washington Post*, 15 July 1995, A20.

² President William J. Clinton, Joint Press Conference by President Clinton and President Boris Yeltsin, Moscow, 10 May 1995.

³ See Victor A. Utgoff, *The Challenge of Chemical Weapons: An American Perspective* (New York: St. Martin's Press, 1991), 241-2. See also, Anthony H. Cordesman, "One Half Cheer for the CWC: Putting the Chemical Weapons Convention in Military Perspective," in *Ratifying the Chemical Weapons Convention*, ed. Brad Roberts (Washington, D.C.: Center for Strategic and International Studies, 1994), 44.

⁴ Dunbar Lockwood, "Getting Down to Business," *Bulletin of the Atomic Scientists* 51, no. 1 (January/February 1995): 12-13. For more on the former Soviet nuclear arsenal and the evolution of the CTR program, see Zachary S. Davis and Jason D. Ellis, "Nuclear Proliferation: Problems in the States of the Former Soviet Union," CRS Issue Brief IB91129 (Washington, D.C.: Library of Congress, Congressional Research Service, 28 June 1995); Amy F. Woolf and Theodor

agreement that the CTR program has made impressive strides in improving the security of former Soviet nuclear weapons, facilitating the dismantlement of delivery vehicles, and providing assistance and opportunities to enable Russia's nuclear experts to apply their skills to peaceful uses, not to nuclear proliferators or terrorists.

Perhaps because U.S. policy makers have been so preoccupied with addressing the nuclear agenda, comparatively little thought has been given to chemical matters. However, it is prudent to examine the potential for theft and black marketeering of Russia's chemical weapons given Japan's horrifying encounter with chemical terrorism. Nerve agents, including VX, sarin, and soman, comprise over 80 percent of Russia's 40,000 metric ton chemical arsenal.⁵ With regard to Russia's chemical weapons storage facilities, Russian Army Chief of Staff Gen. Mikhail Kolesnikov recently described the security measures at these facilities as "inadequate," pointing out that the chemical arsenal is "more vulnerable to theft" since the location of Russia's seven storage facilities has become a matter of public record.⁶ This information was classified until mid-January 1994, when *Rossiiskaya Gazeta* published the amount and types of chemical agents stored at each site.⁷ Russia's blister agents—mustard and lewisite—are stored at Gorny and Kambarka. The remaining sites are Kizner, Leonidovka, Maradykovsky, Pochev, and Shchuche. These sites store mostly nerve agents, such as VX, sarin, and soman. For a map of these sites and the types of munitions stored at each, see page 36.

Some of those who have been to Russia's chemical weapons storage facilities provide a disquieting picture regarding the security of the sites. The following paragraphs provide a general description of the security provisions that appear to be in place at four of the seven Russian storage sites.⁸ While this description is based on first-hand accounts, some caveats must be attached to it. First, these eyewitnesses may not have noticed all of the security measures present. Second, Russian officials may have purposefully changed their practices while visitors were present or after they left to protect the integrity of their security measures. Third, Russian officials may have controlled the visit so that outsiders saw only partial views of the facilities. Fourth, the differences observed in security from one site to another may be attributed to one or more of these factors. Finally, these accounts may be biased toward Western security practices.

W. Galdi, "Nuclear Weapons in the Former Soviet Union: Location, Command, and Control," CRS Issue Brief IB91144 (Washington, D.C.: Library of Congress, Congressional Research Service, 13 February 1995); U.S. General Accounting Office, *Weapons of Mass Destruction: Reducing the Threat From the Former Soviet Union*, GAO/NSIAD-95-7 (Washington, D.C.: U.S. General Accounting Office, October 1994).

⁵ About 70 percent of the 32,500 metric tons of nerve agent in Russia's stockpile is in air-delivered munitions. Walter L. Busbee, "Now for the Heavy Lifting: Destroying CW Stockpiles in the United States and Russia," in *Ratifying the Chemical Weapons Convention*, 111.

⁶ "Russian Security Inadequate for Chemical Weapons Storage," Agence France Presse, 2 August 1995.

⁷ Igor Vlasov, "Chemical Splinters in Russia's Body," *Rossiiskaya Gazeta*, 15 January 1994, 3.

⁸ The author interviewed people who had visited one or more Russian facilities, asking them about security measures they did or did not observe. Those interviewed were at these facilities for varying periods of time, from hours to days. Several of these individuals, who had different affiliations, gave descriptions of specific sites. The author has elected to provide a general description, accompanied by examples, without identifying the particular sites involved. She would like to emphasize that **no one** who spoke with her revealed classified information. For a rare and brief public account of a U.S. inspection conducted under the Wyoming Memorandum of Understanding, see Joseph D. Richard, "'Team Morris' Inspects Russia's Pochev Facility," *On-Site Insights* 6, no. 8 (September 1994), 4-5.

Security for chemical weapons has three basic components: physical barriers at a particular site, human controls/guards, and the system of accountability. Ideally, these components work together to block theft from outside or inside the facility. Physical barriers are items such as fences, locks, and other security devices intended to deter an attack against a facility or impede the attackers until guards can respond. Guards at a facility control access to the compound, monitoring the perimeter and checking vehicle and pedestrian traffic to prevent unauthorized personnel from entering. If the physical security at a facility were to be breached, it is the responsibility of these troops to respond, engage, and fend off attackers. The system of accountability entails the procedures that a nation uses to keep track of chemical weapons in the inventory and the chemical agent in bulk storage at various sites.

Physical Security at Russian Chemical Weapons Storage Sites

In general, outsiders who have been to Russian chemical weapons storage facilities characterize the security at these sites as similar to the measures commonplace at U.S. storage facilities in the 1950s. Since then, the United States has switched to an approach that employs significant physical barriers, intruder alarms, and other electronic sensors monitored from a central security control room.⁹ In contrast, Russian chemical weapons storage facilities have the bare basics of physical security for a sensitive military site—multiple exterior fences, storage buildings, and padlocks.¹⁰

One of the storage sites visited was a stand-alone facility, but the others were inside or collocated with a larger military compound.¹¹ Normally, the chemical weapons storage area had different entrances for pedestrians, road vehicles, and railroad cars. At two sites, a two-gate entrapment system was used at the main entry. Guards were present at the main gates at all facilities.¹² Railroad entrances—padlocked double-opening fences were observed—did not appear to be guarded.¹³ More than one individual observed that the railroad tracks into the restricted chemical storage area were rusted, with grass overgrowing the tracks, and did not look like they had been used in a long time.¹⁴ At one facility that was adjacent to another compound, an unguarded gate in the fence separating the two areas could be seen.¹⁵

⁹ Interviews by author, 28 July 1995, 31 July 1995, and 11 August 1995.

¹⁰ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 30 August 1995, 31 August 1995, 18 September 1995.

¹¹ Interviews by author, 28 July 1995, 31 July 1995, 31 August 1995, 18 September 1995. According to Representative Glen Browder (D-Alabama), family housing units were inside the larger military compound at one storage site, with children playing nearby the restricted chemical storage area. Interview with Congressman Glen Browder, Washington, D.C., 14 September 1995.

¹² Interviews by author, 28 July 1995, 31 July 1995, 31 August 1995, 18 September 1995. At one of the entries to the restricted area at one site, the guard was inside a plexiglass booth and pedestrians had to pass through a turnstile. Interview by author, 21 August 1995. In a two-gate entrapment, entering vehicles are stopped between the outer and inner gates, while the guard checks identification prior to opening the inner gate.

¹³ Interviews by author, 31 July 1995, 21 August 1995, 31 August 1995, 18 September 1995.

¹⁴ Interviews, 28 July 1995, 11 August 1995.

¹⁵ Interview by author, 31 August 1995.

Different combinations of fences are used for perimeter security at Russian chemical weapon storage sites. Some fences were chain-link, some were barbed wire, and some were apparently electrified. Two concentric exterior fences were erected at some sites, three or four fence lines at others. Some fences were in good repair, others appeared to be poorly maintained. At one site where the storage facility was inside a larger compound, a wall, approximately eight feet high, had been erected around the chemical weapons storage area.¹⁶ One interviewee described the outer fencing as "tall cattle fences."¹⁷ The zone between the innermost and outermost fences was cleared and well-maintained at some sites, allowing for foot or vehicle patrols. In some cases, a clear zone was established outside the outermost fence and a worn path indicating perimeter patrols was evident. In other cases, the outermost fence was directly adjacent to a village or wooded area, and the direction of the observed paths indicated pedestrian traffic to and from a nearby village, not perimeter guard activities.¹⁸ According to one individual, at one site "there had been clear zones," but this area was not well-maintained.¹⁹ At two sites, perimeter lights along the fence line were seen, but the lights were few in number and did not appear to be well-maintained.²⁰ Perimeter lights were not observed at the other facilities.²¹ No electronic security devices, such as closed-circuit or low-light TV cameras, were observed on or near the exterior fences.²²

Some storage buildings were constructed with cement blocks and had wooden or steel-faced doors.²³ Others were made only of wood and had wooden doors and windows with bars. The roofs of these buildings were often made of tile or wood. At one site, holes could be seen in the roof, but at other sites, the buildings were well-maintained. The buildings at one facility had just been re-roofed.²⁴ Several people interviewed observed nothing other than a single-key padlock on the doors to storage buildings.²⁵ At one site, the doors to storage buildings had an additional bar across the door required a separate device or key to unlock, but the lower section of these doors had unsecured lift-up "dog doors" used for first-entry monitoring. Given the "material of construction and the kinds of locks they used, it was nothing that a locksmith couldn't defeat," said one interviewee.²⁶ Intruder detection devices—probably a circuit-breaker

¹⁶ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 31 August 1995, 18 September 1995.

¹⁷ Interview by author, 18 September 1995.

¹⁸ Interviews by author, 11 August 1995, 21 August 1995, 31 August 1995.

¹⁹ Interview by author, 18 September 1995.

²⁰ Interviews by author, 28 July 1995, 31 July 1995, 31 August 1995.

²¹ Interviews by author, 11 August 1995, 21 August 1995, 18 September 1995.

²² Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 30 August 1995, 21 August 1995, 18 September 1995. Browder did not observe any electronic surveillance or intruder detection equipment at one site. Interview with Browder, 14 September 1995.

²³ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 31 August 1995, 18 September 1995. Some of the cement block buildings at one site had large openings, approximately 6 feet by 6 feet, that were covered by a wire mesh grill. Interview by author, 28 July 1995.

²⁴ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 31 August 1995, 18 September 1995.

²⁵ Interviews by author, 31 July 1995, 11 August 1995, 21 August 1995, 30 August 1995.

²⁶ Interview by author, 18 September 1995.

mechanisms—were observed on the doors to individual storage buildings at second site and possibly at a third.²⁷ No one recalled electronic or other intruder detection sensors on the other openings to these buildings (e.g., windows).²⁸

Inside these buildings, munitions were kept in racks, similar to the storage of wine bottles, or stacked horizontally on wooden pallets. Bulk storage drums were elevated on beams to facilitate monitoring for corrosion or a clean-up effort in the event of a leak.²⁹ Smaller items, like munitions and storage drums were numbered, most likely with production lot, not serial, numbers.³⁰ Missile warheads also appeared to be marked with production lot numbers. Each warhead had its own numbered storage container.³¹ At one site, caged birds were kept inside the cement storage buildings—a time-tested method of detecting whether chemical agent is present. The death of the bird is a likely indicator of a leaking weapon or container.³²

The munitions and bulk storage containers observed were well-maintained, in good to excellent condition.³³ As Congressman Glen Browder (D-Alabama) reported after a visiting a Russian storage site in 1994, "The chemical shells and warheads which we inspected appeared to be in good condition, having been manufactured between the early 1950s and mid-1980s, and were battlefield-ready."³⁴

Interviewees did not observe physical barriers, such as an large obstacle that would have to be moved, in front of storage building doors. Nor were tamper detection seals seen on any storage building doors.³⁵ Seals were used sporadically at some sites, apparently not at all at others. For example, the large 50-cubic meter storage tanks and storage drums were sealed at one site, but at another, these large storage tanks apparently were not sealed. The containers for missile warheads were sealed at one site, but the other items there were not sealed. The seals that were observed were wire-loop or lead seals that were dated and numbered. Ostensibly, either the seal has to be broken or the wire cut to open them.³⁶

²⁷ Interview by author, 28 July 1995. At one site, an individual saw what might have been a roller or switch on the door, but could not be certain that that was the case. The accompanying soldier did telephone someone before unlocking the door to enter the building. Interview by author, 31 August 1995.

²⁸ Browder did not observe any electronic surveillance or intruder detection equipment at one site. Interview with Browder, 14 September 1995. Nor did others observe such devices on storage doors or within buildings. Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 30 August 1995, 18 September 1995.

²⁹ Interviews by author, 31 July 1995, 11 August 1995, 21 August 1995, 18 September 1995.

³⁰ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 31 August 1995, 18 September 1995.

³¹ Interviews by author, 31 August 1995, 18 September 1995.

³² Interview by author, 31 July 1995.

³³ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995, 31 August 1995, 18 September 1995.

³⁴ Representative Glen Browder, Memorandum to Representative Ronald V. Dellums, Chairman, House Armed Services Committee, "July 3-10 Codel to Concerning Chemical Weapons," 25 July 1994.

³⁵ Interviews by author, 31 July 1995, 11 August 1995, 31 August 1995, 18 September 1995.

³⁶ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 18 September 1995.

Guards and Accountability at Russian Chemical Weapons Storage Sites

Physical security aside, more than one individual interviewed dwelled on the human component of security at Russia's chemical weapons storage facilities. As noted, main gates were guarded and the identification of visitors was checked before they were allowed to enter. Visitors were issued badges.³⁷ Armed perimeter patrols were seen at some sites, but not at others. Guards were not stationed at individual storage buildings at the time that visitors were there. The troops encountered were courteous and well-disciplined. Morale was good; these soldiers did not appear to be discontent.³⁸ One individual observed that there were "No signs of things falling apart around the seams," but another noted that one site was poorly maintained.³⁹ Soldiers had expressed concerns about "bandits" in the area, recalled one interviewee.⁴⁰

Following Soviet precedent for tracking the whereabouts of weapons, the soldiers at these facilities use a "personalized" system of accountability. Officers are personally responsible for the chemical weapons stored within a given number of buildings, usually one to five buildings. With smaller items such as artillery shells, this means that a single officer can be responsible for hundreds of weapons. If something is missing, this officer is held accountable. Written records are kept, and the location of munitions or drums is noted on a planograph or a diagram of the building's contents. A computer database, however, is not used.⁴¹

At some sites, soldiers stated that they entered storage buildings frequently, even on a daily basis, for maintenance and inventory activities.⁴² Such statements could not, of course, be confirmed. However, some individuals witnessed inventory and maintenance procedures. For example, racks of munitions, stacked from the floor to the ceiling, were painstakingly inventoried, as were rows of storage drums. Results were recorded on the aforementioned planograph.⁴³ Soldiers used a 15-foot long dipstick to measure the level of agent in the 50-cubic meter storage tanks. They also conducted an analysis of the contents to ascertain the concentration of key chemicals. To prevent the rupture of storage drums, it is standard Russian procedure to open these drums periodically to relieve the gas pressure that builds up inside. Storage drums, tanks, and munitions were checked for signs of disrepair or corrosion.⁴⁴

³⁷ Interviews by author, 31 July 1995, 21 August 1995, 31 August 1995, 18 September 1995.

³⁸ Interviews by author, 28 July 1995, 31 July 1995, 11 August 1995, 21 August 1995. At one site, the enlisted soldiers were "run-of-the-mill," not the type of soldier that would be assigned to guard sensitive military facilities in the West. The officers were "clearly disgruntled at having to open the facility" to outsiders. Interview by author, 18 September 1995. In contrast, Browder noted that inside the chemical weapons storage section, his hosts were quite open to having him look around the site. Browder, interview by author, 14 September 1995.

³⁹ The first comment was made in an 11 August 1995 interview; the second in an 18 September 1995 interview.

⁴⁰ Interview by author, 31 August 1995.

⁴¹ Interviews by author, 30 August 1995, 31 August 1995.

⁴² Interviews by author, 31 July 1995, 30 August 1995.

⁴³ Interviews by author, 31 July 1995, 31 August 1995.

⁴⁴ Interviews by author, 31 July 1995, 11 August 1995.

Evaluating the Security of Russia's Chemical Arsenal

In some respects, the security measures described above do not appear to be too far out of order. Thieves cannot just walk off with a 50-cubic meter tank full of chemical agent.⁴⁵ Racks of artillery shells are placed so close together that it would be difficult to maneuver lifting equipment inside the building to cart off several racks of artillery shells.⁴⁶ Some storage sites are a restricted area inside of a larger military compound, which would make it more difficult to violate security. In other words, the way that Russian chemical weapons and bulk agent are stored creates some built-in security features.

In other instances, this account raises some grave concerns, especially for those who are familiar with routine security procedures at sensitive U.S. military sites. By U.S. standards, Russian chemical weapon storage facilities unquestionably appear to be vulnerable to attack from outside and theft from within. In the discussion that follows, apparent shortfalls are identified and possible scenarios for foul play are raised. General U.S. standards of physical security and accountability practices are presented as a point of comparison.

Shortcomings in the physical security were readily apparent at the Russian storage facilities visited. For example, perimeter fences lacked electronic sensors and intrusion detection devices. In the absence of well-maintained clear zones and perimeter lighting, attackers have more cover for a stealthy approach. Railroad entrances at these facilities could be a particularly egregious breach of perimeter security, since they were apparently unguarded and secured only with a single-key padlock.⁴⁷ Single-key padlocks were frequently the only visible barrier to entrance at individual storage buildings. Additional physical barriers were not seen. In the majority of cases, intrusion detection devices apparently were not installed.⁴⁸ A lone padlock on any door, especially a wooden door, is hardly an impediment to thieves or attackers. At the one site where storage tanks and drums were sealed, the technology used was not tamper-proof.⁴⁹

These measures fall far short of the physical security at U.S. chemical weapons storage sites. For example, two continuous lines of intrusion detection sensors, as well as imaging systems (e.g., closed-circuit TV, radar, and infrared detectors), buttress perimeter fencing, lighting, and clear zones. Where appropriate, vehicle barriers such as concrete blocks, ditches, and posts embedded in the ground are situated to prevent vehicles from crashing gates or fences. In addition, huge concrete blocks are placed immediately in front of the entrance of U.S. bulk storage buildings, which are built of concrete and sometimes also bermed. These so-called "King Tut"

⁴⁵ Interview by author, 11 August 1995.

⁴⁶ Interview by author, 21 August 1995.

⁴⁷ Interviews by author, 21 August 1995, 30 August 1995, 31 August 1995.

⁴⁸ Interviews by author, 11 August 1995, 21 August 1995, 31 August 1995.

⁴⁹ To foil these wire loop or lead seals without detection, the thief would need to replicate the seal that leaves an imprint on the lead. This type of sealing technology was common in the 1970s. Fiber-optic, tamper-proof seals can now be readily obtained. Interview by author, 28 July 1995. Another person noted that the Russians also use a "primitive" string and clay pot seal at nuclear facilities, which can be spoofed by un-threading the string to gain access and then rethreading the string through the clay in the pot. As noted, much more advanced seal technology is available. Interview by author, 30 August 1995.

blocks are so heavy that a forklift must remove them to enable access. U.S. regulations require that two soldiers be present to open a storage building. Each has possession of a separate key to unlock one of the two high-security padlocks on the door. When entry occurs, at least one other soldier will be alerted. Balanced magnetic switches or other intrusion detection sensors are placed on all doors, windows, and movable openings of U.S. storage buildings. These sensors, which are tamper-protected, automatically notify the security control center, which is manned 24 hours a day, of intrusions of perimeter and individual building security.⁵⁰ Table 1 compares the security measures generally practiced at U.S. storage sites with the physical security observed at some Russian storage sites.

Of the physical security at Russian chemical weapons storage sites, one interviewee characterized it as suitable "to keep an honest man out," another as "rudimentary."⁵¹ A much harsher assessment was offered by another individual, who concluded, "You could really walk into that place without any problem."⁵² Browder observed that "Their facilities were not as secure as ours, especially regarding physical security."⁵³ Yet another person acknowledged the shortcomings in physical security, but thought that Russia's chemical weapons are probably "secure as long as the people who are guarding them want them to be safe."⁵⁴ This statement brings up a different set of concerns related to the Russian system of accountability and potential problems among Russian troops and chemical weapons experts.

A fair amount of Russia's chemical agent is in bulk storage containers. One is not counting munitions as much as tons of agent. While measurements from large storage tanks provide a rough idea of how much agent is there, these circumstances could present an accountability problem.⁵⁵ Chemical agents are not stable and tend to deteriorate gradually. Unless the seals on these tanks are tamper-proof and daily measurements, both of quantity and quality, are taken and cross-checked by individuals that are not within the immediate chain of accountability, it would be difficult in the event of a discrepancy to tell whether chemical agent leaked or was stolen. In other words, there did not appear to be significant obstacles to prevent someone from systematically skimming small quantities of agent out of bulk storage containers.⁵⁶

⁵⁰ *Military Police: Chemical Agent Security Program*, Army Regulation 190-59 (Washington, D.C.: Department of the Army, 27 June 1994), 6-11, 16-17, 37. Interviews by author, 11 August 1995, 21 August 1995, 31 August 1995. Other documents that stipulate the security and safety practices followed at U.S. chemical weapons storage sites include *Chemical Surety*, Army Regulation 50-6 (Washington, D.C.: Department of the Army, 12 November 1986); *Safety: Toxic Chemical Agent Safety Standards*, Pamphlet 385-61 (Washington, D.C.: Department of the Army, currently being revised); *Medical Services: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT*, Pamphlet 40-173 (Washington, D.C.: Department of the Army, 30 August 1991); *Medical Services: Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Nerve Agents GA, GB, GD, and VX* (Washington, D.C.: Department of the Army, 4 December 1990).

⁵¹ Interview by author, 11 August 1995, 18 September 1995.

⁵² Interview by author, 21 August 1995.

⁵³ Interview with Browder, 14 September 1995.

⁵⁴ Interview by author, 28 July 1995.

⁵⁵ Interview by author, 8 August 1995.

⁵⁶ Interviews by author, 28 July 1995, 30 July 1995.

**Table 1: A Comparison of Physical Security
at U.S. and Russian Chemical Weapons Facilities**

<i>Perimeter Security</i>	United States^a	Russia
<i>Clear Zones</i>	<ul style="list-style-type: none"> • Clear zones maintained 30 feet outside of the outer fence • Reinforced with steel cables to prohibit vehicle penetration of the outer fence, and, terrain permitting, speed bumps, highway barriers, or steel posts partially embedded in the ground prevent high-speed vehicle approaches 	<ul style="list-style-type: none"> • In some cases, clear zone and patrol path evident around the perimeter; in others, outer fence adjacent to a forest or village • Clear zones reasonably well-maintained between fences, except at one site
<i>Fencing</i>	<ul style="list-style-type: none"> • Two concentric perimeter fences, seven feet high, with barbed or razor wire outriggers • Clear zones maintained between fences as well as inside inner fence 	<ul style="list-style-type: none"> • Sites have two to four concentric rings of fencing, either chain link, barbed wire, or electrified • At one site, restricted area surrounded by a wall • Fences in disrepair at some sites
<i>Lights</i>	<ul style="list-style-type: none"> • Perimeter lights illuminate entire area inside the fences, between the fences, and the clear zone outside the outermost fence 	<ul style="list-style-type: none"> • At two sites, perimeter lights observed, but they were few in number or appeared to be poorly maintained • No lights observed at the other sites
<i>Gates</i>	<ul style="list-style-type: none"> • A two-gate entrapment system^b for vehicles • Armed guards check and/or inspect all personnel and vehicles entering or exiting main gate • Crash barriers installed when appropriate • Personnel use a secured separate gate; other emergency gates secured with locks and a variety of sensors to detect intrusion 	<ul style="list-style-type: none"> • Separate gates exist for railroads, pedestrians, and road vehicles • Only main gates appeared to be guarded • Guards checked identification and issued badges • A two-gate entrapment system^b was used at two sites, while another, inside a larger military compound had a turnstile for pedestrian entry • Railroad gates closed with a padlock
<i>Intrusion Detection System</i>	<ul style="list-style-type: none"> • Two continuous intrusion detection system lines, each with different sensing methods, installed to detect entry into the perimeter area • Sensors monitored 24 hours a day from central security control facility 	<ul style="list-style-type: none"> • None observed
<i>Closed-Circuit TV</i>	<ul style="list-style-type: none"> • Closed-circuit TV with tamper-proof barriers allows for real-time identification of intruders 	<ul style="list-style-type: none"> • None observed

^a Security at U.S. facilities varies slightly from site to site, but in such cases, compensatory measures are taken. For a more detailed explanation of security at United States facilities, such as reinforced guard houses and the many other security measures required, see *Military Police: Chemical Agent Security Program*, Army Regulation 190-59 (Washington, D.C.: Department of the Army, 27 June 1994).

^b Guards open the outer gate to allow the vehicle to enter and close it while identification checks are conducted. Only after completing this process will the guard open the inner gate.

**Table 1: A Comparison of Physical Security
at U.S. and Russian Chemical Weapons Facilities**

Storage Buildings	United States^a	Russia
<i>Building Construction</i>	<ul style="list-style-type: none"> • Walls either 8-inch thick reinforced concrete or reinforced cement blocks • Windows, ceilings, and roof provide resistance to penetration equal to the walls • Some storage bunkers bermed • Steel-reinforced wood or steel-reinforced metal doors constructed to prevent prying or jacking 	<ul style="list-style-type: none"> • Some buildings constructed of cement blocks, while others made of wood • Cement-block buildings had wooden or steel doors; wooden buildings had wooden doors • Some buildings had bars on windows, some had large mesh grills • At one site, holes observed in the roof; at another, buildings had just been re-roofed
<i>Doors: Physical Barriers and Locks</i>	<ul style="list-style-type: none"> • King Tut blocks, or similar concrete barriers, placed in front of doors whenever feasible • Doors have 2 high-security padlocks • No one person possesses keys to both locks • Keys secured when not in use 	<ul style="list-style-type: none"> • Storage building doors secured with single key padlock • Doors at one site had a bar requiring a separate key or tool to open, as well as unsecured, lift-up "dog doors" to facilitate first-entry monitoring
<i>Intrusion Detection System</i>	<ul style="list-style-type: none"> • Intrusion detection systems such as motion sensors with tamper detection devices on all openings in all storage buildings 	<ul style="list-style-type: none"> • Intrusion detection devices (circuit-breakers) observed on doors at one site, and possibly at another • At other sites, no confirmed observation of electronic or other intruder detection sensors on entrances or other openings to storage buildings

^a Security at U.S. facilities varies slightly from site to site, but in such cases, compensatory measures are taken. For a more detailed explanation of security at United States facilities, such as reinforced guard houses and the many other security measures required, see *Military Police: Chemical Agent Security Program*, Army Regulation 190-59 (Washington, D.C.: Department of the Army, 27 June 1994).

Moreover, the soldiers, not the officer accountable, are apparently conducting the inventory and maintenance chores. Therefore, another possibility is that with so many munitions, a number of artillery rounds could disappear before the officer in charge might notice.⁵⁷ What is not known at this point is what procedures, if any, the Russian military has for cross-checking these records. If inventory records are not routinely and randomly cross-checked by others outside the immediate unit and facility where accountability in the Russian system apparently rests, it would not be a great challenge for one or more soldiers to falsify these records. In short, theft

⁵⁷ Interviews by author, 21 August 1995, 30 August 1995, 31 August 1995.

appears to be possible if Ivan, the individual soldier, is so inclined; if a colleague and Ivan conspire; or if an outsider coopts or disables Ivan.

In contrast, accountability at U.S. storage facilities is institutionalized, collective, and computerized. U.S. storage igloos and bunkers are infrequently opened for random inventory and maintenance activities. When a soldier engages in maintenance chores or takes an inventory count, his work is double-checked and cross-checked by others to ensure its accuracy. A written planograph and computerized records are updated accordingly. These records account for the number and type of munitions in each bunker and at each storage facility. Munitions are tracked by serial number and/or production lot number. Officials at a central record keeping unit in Rock Island, Illinois, also review this data. The commanding officer here is the individual accountable for the U.S. chemical weapons inventory. Units from this central command are randomly sent to the eight storage depots in the United States to check the accuracy of these records.⁵⁸

In all fairness, U.S. security and accountability at U.S. chemical storage facilities are not perfect. Furthermore, U.S. newspapers often describe breaches in security or acts of vandalism at U.S. regular military bases. Problems also occur with the reliability of the military personnel at sensitive U.S. facilities. The armed services do not publicize such incidents because they are embarrassing and detract from public confidence in the safety of the military bases in their midst. At U.S. chemical weapons storage sites, disgruntled soldiers—"the Timothy McVeighs of this world," as one interviewee put it—could be among the personnel. However, because of the redundancies in the U.S. physical security and in the system of accountability, a malcontent would have to recruit others in different units in order to defeat the physical security and the system of accountability. The odds of an insider successfully stealing chemical agent or munitions from a U.S. facility without being caught somewhere along the way are quite low.⁵⁹

One must also understand that the redundancy and technical sophistication that gird the physical security and accountability at U.S. chemical weapons storage sites did not appear overnight. For instance, U.S. recordkeeping has been computerized to some extent for a long time and has gradually improved to make the records more specific. Also, it was not that long ago that rabbits were kept in U.S. storage bunkers to indicate whether the munitions within had leaked. What may be viewed as old-fashioned methods are nonetheless proven and work well.

Some of the fundamental differences in apparent Russian and U.S. security provisions are due to the nature of the respective Russian and American chemical weapons stockpiles. For

⁵⁸ Interviews by author, 7 September 1995, 30 August 1995, and 31 August 1995. The arsenal at a ninth U.S. facility, on Johnston Island in the Pacific Ocean, is currently being destroyed. The one-ton bulk storage tanks present at some U.S. facilities are sealed and occasionally weighed to ascertain whether any agent is missing.

⁵⁹ Interview by author, 30 August 1995. Note that there have been numerous threats of terrorist use of chemical weapons, including one instance in 1975 where 53 canisters of the blister agent mustard were stolen from a U.S. chemical weapons storage facility in West Germany. The terrorists, probably associated with the Baader-Meinhof gang, did not carry out their threat and some, but not all of the stolen agent was recovered. In another example, a neo-Nazi skinhead group had plans in 1992 to kill children in a Dallas Jewish day-care center using cyanide. For a listing of reported threats, possession, and use of chemical agents for terrorist purposes, see Ron Purver, *Chemical and Biological Terrorism: The Threat According to the Open Literature* (Toronto: Canadian Security Intelligence Service, June 1995), 82, 84-5. See also Robin Wright, "Many Nations Seen Vulnerable to Poison Use," *Los Angeles Times*, 21 March 1995, 1.

instance, many U.S. chemical weapons such as the M-55 rocket are "full-up," with the explosives and propellents inside the munition. U.S. storage buildings are therefore built to withstand an explosion of high explosives and to contain the chemical agent. The explosives and propellents for Russian chemical weapons are reportedly stored apart from the part of the munition that contains the chemical agent. Since there is less inherent danger for an explosion within a Russian chemical weapons storage building, there is not a pressing safety requirement for especially sturdy storage buildings.

As for some of the noticeable disparities related to accountability, the current Russian system is manpower-intensive largely because the Soviet Union could command significant human resources for a task. The officers in charge of Russia's chemical facilities are simply following precedent. The U.S. approach to accountability grew out of necessity. U.S. bunkers are tightly secured and not entered as frequently because as the U.S. stockpile aged, more leaks occurred.⁶⁰ In other words, the United States battened down the hatches and switched to a system of quarterly storage monitoring inspections and random checks initially for personnel and public safety reasons.

However, with a personalized system of accountability and minimal physical barriers, there appear to be some gaps in security at Russian facilities. Moreover, as one interviewee pointed out, the storage sites are a long way from Moscow and the borders of the former Soviet Union are becoming increasingly porous. "Sooner or later, someone will make [the soldiers at these sites] a better offer than Moscow does. If something was missing, it is likely to be an inside job."⁶¹ With Russia's ailing economy and the limited resources now available to the Russian armed forces, the potential thus exists for insider theft and black marketeering for personal economic gain.⁶² Wayward political affiliations could also be the motivating factor behind an inside theft from a Russian chemical weapons facility.

If such an incident were to occur, another concern raised was the preparedness of Russian authorities to respond. Do local military units and national authorities routinely assess the security vulnerabilities of these facilities? Do they have recovery plans and the equipment to execute them? Do they conduct training exercises to practice the recovery of chemical weapons? How

⁶⁰ From 1983 to 1944, there were 1,862 leaks within the U.S. stockpile. U.S. Army Chemical Demilitarization and Remediation Activity, *Annual Status Report on the Disposal of Lethal Chemical Weapons and Materiel* (Department of the Army, 15 December 1994), 37.

⁶¹ Interview by author, 28 July 1995.

⁶² During a report on French television showing an image of Saratov, a reporter intoned, "You can get in here almost at will. But it ought to be one of the best guarded places in Russia, one of the six or seven storage centers for thousands of tonnes of toxic gas formerly produced by the Soviet Union....Everything leads one to believe that the least self-respecting terrorist would have no difficulty in hold of a few liters. Here everything is for sale and everything can be bought." "Official On Availability of Chemical Weapons in Russia," France-2 Television Network, 21 March 1995, FBIS Translation. Saratov is actually a military academy, where training of Russia's chemical troops occurs, not one of Russia's chemical weapons storage facilities. The equivalent in the United States is Ft. McClellan in Alabama.

quickly can Russian authorities mobilize to respond?⁶³ At this point, the answers to such questions are not known.

Some might ask why anyone would bother to steal Russian chemical weapons when chemical agents are not that difficult to make, compared to a nuclear device. The ingredients and equipment are commercially available, and the formulas for many chemical agents are common scientific knowledge.⁶⁴ Of course, it has always been difficult to predict what disturbed workers, rebels, or terrorists will do, but those who want to inflict the most serious harm may seek military-strength chemical agent. Terrorists may be able to concoct a chemical agent, but it is not as easy as some might believe to make highly effective chemical agent. For instance, evidence indicates Aum Shinrikyo's chemists were unsuccessful in their attempts to manufacture high-grade sarin.⁶⁵ Their failure ultimately saved the lives of thousands who were in the Tokyo subway last March 20th.

Another factor to consider is that chemical weapons are easier to use than nuclear weapons. With chemical weapons, thieves do not have to overcome the security devices or Permissive Action Links (PALs) that are often placed on individual nuclear weapons. Nor do they have to figure out the launch codes and sequences that are likely to frustrate an attempt to use a stolen nuclear weapon. Instead, the would-be users of chemical weapons purchased on the black market or stolen from a facility can shield themselves with protective clothing and gas masks that are commercially available. If they have artillery guns or aircraft, they have the option to use chemical munitions as is or to drain them and fashion their own crude delivery system.⁶⁶ "Once stolen, a chemical weapon is far easier for a terrorist or rebel military group to use than a nuclear

⁶³ Interview by author, 31 August 1995. In a related readiness issue, Browder noted that the preparedness of Russian soldiers to respond to an accident or incident with chemical weapons appeared to be meager. Interview with Browder, 14 September 1995. Noting that the fire-fighting equipment within the restricted area consisted of axes, sand-filled buckets, and buckets for bailing water, another interviewee described their "ability to respond to fire or security threats was marginal to nonexistent." Interview by author, 18 September 1995. All U.S. storage facilities conduct routine vulnerability assessments and have plans and drills to practice a response to locate and recover stolen munitions. *Chemical Agent Security Program*, 22, 31-32.

⁶⁴ Many of the same chemicals that can be used to produce pharmaceuticals, textile dyes, and pesticides can also be used to make chemical agents. For this reason, the Chemical Weapons Convention contains unprecedented verification provisions that control such "precursor" chemicals and require reporting and inspection within the commercial chemical industry. While such procedures will help international inspectors track and assess commercial activities with dual-use chemicals, the ingredients, equipment, and know-how to make chemical weapons will be on the open market indefinitely.

⁶⁵ Interview with Kyle Olson, Washington, D.C., 14 September 1995. Olson is writing a book about the recent events in Japan.

⁶⁶ The Aum Shinrikyo cult executed its attack on Tokyo's subway by placing low-grade sarin in two-ply plastic bags and using umbrellas or other sharp objects to puncture these bags quickly before exiting the subway cars. Unsuspecting passengers left on those cars were quickly overcome with fumes, which also made their way into the subway stations when the effected trains stopped to release passengers. Interview with Olson, 14 September 1995. Olson also observed that Russian chemical weapons are comparatively safe to transport since the high-explosive component reportedly is stored separately from the chemical munition.

weapon."⁶⁷ Moreover, the use of poison gas is not perceived as being as heinous as the use of nuclear weapons.⁶⁸

When asked to assess the threat of Russian nuclear weapons being stolen versus the possibility of Russian chemical weapons theft, one interviewee viewed the threat as "very much the same."⁶⁹ Others interviewed differed with this opinion. They believed that Russia's chemical arsenal presents a far more exposed and appealing target for potential thieves or attackers.⁷⁰

Although security apparently varies from facility to facility, security at Russian nuclear facilities was described as generally better than the security observed at Russian chemical weapons storage sites. Russian nuclear facilities have redundant perimeter fences; steel doors on storage buildings; electronic sensors; and serial numbers, seals, and PALs on warheads, which have accompanying containers that each have their own "passport" control documents. Using a 1 to 10 scale, with 10 being the highest grade of security, one interviewee rated U.S. nuclear security a 9.9, Russian nuclear security an 8, U.S. chemical weapons security a 9+, and Russian chemical weapons security a 3.⁷¹ From another individual, the security of Russian chemical weapons also received a rating of 3, while security at U.S. storage sites was rated from 8 to 10, depending upon the facility.⁷²

Finally, U.S. policy makers should also be cognizant of the gradual disintegration that has taken place throughout Russia's complex of research, production, and storage facilities. The effects of economic hardship show not only in the apparent differences in physical security and maintenance observed from one storage facility to another. Hundreds of chemical weapons experts are out of work. With less and less cohesion among this research community, the temptation for these experts to sell their knowledge to the highest bidder will increase if they cannot find more productive and peaceful ways to support themselves and their families. Unlike nuclear development programs, where a relatively small number of people know all of the crucial information about making a nuclear weapon, the knowledge threshold for chemical weapons is not nearly as high. A larger number of Russian chemical weapons specialists know enough to benefit greatly the efforts of would-be chemical weapons proliferators.⁷³

⁶⁷ Interview by author, 30 August 1995.

⁶⁸ Throughout history, warring parties have resorted to chemical weapons more frequently than nuclear weapons, which the United States used twice against Japan at the end of World War II. Chemical weapons were a hallmark of World War I and the 1980s Iran-Iraq War. China and Abyssinia also suffered chemical attacks during World War II. For more on the history of chemical weapons use, see Edward M. Spiers, *Chemical Weaponry: A Continuing Challenge* (New York: St. Martin's Press, 1989).

⁶⁹ Interview by author, 28 July 1995.

⁷⁰ Interviews by author, 30 August 1995 and 31 August 1995.

⁷¹ This individual had been to numerous Russian nuclear facilities and had in-depth knowledge of Russian chemical weapons storage facilities. Interview by author, 30 August 1995.

⁷² Interview by author, 18 September 1995.

⁷³ Interview by author, 8 August 1995. For more on the different technology thresholds underlying nuclear and chemical weapons, see U.S. Congress, Office of Technology Assessment, *Technologies Underlying Weapons of Mass Destruction* (Washington, D.C.: U.S. Government Printing Office, December 1993). On chemical weapons proliferation, see U.S. Congress, Office of Technology Assessment, *Proliferation of Weapons of Mass Destruction* (Washington, D.C.: U.S.

Observations and Recommendations

From outward appearances, Russia's chemical weapons storage sites appear to be vulnerable to theft from within and attack from without. In all candor, many American homes have more sophisticated physical security than was observed at some Russian chemical weapons storage sites. For about \$200, sometimes less, U.S. citizens can have motion sensors, door and window contacts, and alarms installed and monitored 24 hours a day for an additional \$22 monthly fee. Alarms bring private security or local police to the scene.⁷⁴

Failure to improve the security at Russian chemical weapons storage facilities increases the odds that chemical agent of Russian origin will find its way onto the black market and into an ethnic conflict, subway system, or building somewhere. Innocent civilians will suffer the repercussions.

Again, the Russian government appears to have recognized the security at these sites as an issue in need of attention. Col. Gen. Stanislav Petrov, the commander of the Radiation, Chemical, and Biological Defense Troops, has requested additional funding to upgrade security at Russia's chemical weapons storage facilities since the locations have become a matter of public knowledge. Worried that this disclosure might fuel the worsening crime situation in Russia, Petrov noted that his already strained budget has been stretched even further by a Ministry of Defense effort to increase guard duty, upgrade the effectiveness of "engineering protection, and carry out vigilance exercises" at chemical weapons storage sites.⁷⁵ With few rubles available, the Kremlin must balance requests for improved security against domestic concerns about the environmental safety of Russia's chemical weapons stockpile, especially the blister agents at Gorny and Kambarka, and proposals to upgrade safety at chemical sites at an estimated cost of 21.6 billion rubles.⁷⁶ If environmental concerns are not addressed, it may be more difficult for the Russian government to persuade local communities to cooperate with the program to destroy the Russian chemical arsenal. For a government being pressed to keep its treaty commitments to eliminate its chemical stockpile, the choice is a difficult one.

While the CTR program was initiated to address the safety and security of all weapons of mass destruction in the former Soviet Union, the overwhelming majority of the Nunn-Lugar funds have gone toward nuclear security and disarmament. This focus on nuclear safety, security, and dismantlement was appropriately geared to the problems recognized at the time. To date, \$55 million or roughly five percent of the over \$1 billion in CTR funds has gone toward assisting the chemical weapons destruction program in Russia.

Government Printing Office, December 1993); Gordon M. Burck and Charles C. Flowerree, *International Handbook on Chemical Weapons Proliferation* (New York: Federation of American Scientists and Greenwood Press, 1991); U.S. House of Representatives, Committee on Armed Services, *Countering the Chemical and Biological Weapons Threat in the Post-Soviet World*, 102d Cong., 2d sess., Committee Print No. 15 (Washington, D.C.: U.S. Government Printing Office, 1993).

⁷⁴ This information reflects prices and services quoted by two home security companies, ADT and Brinks, on 30 August 1995. More elaborate systems are available.

⁷⁵ Anatoly Yurkin, "General Urges More Funds for Guarding Chemical Weapons," ITAR-TASS, 2 August 1995, FBIS Translation.

⁷⁶ "Over R509 Billion Needed to Destroy Chemical Weapons," *Novosti*, Moscow, 1 August 1995, FBIS Translation.

For a rather modest amount, the United States could help Russia markedly enhance security at these sites. Perimeter security could be strengthened to allow guards to detect and respond to intruders more rapidly. Lights and closed-circuit TV could be added. Physical security at individual buildings could be reinforced with better doors, locks, and King Tut blocks. More advanced seals would also appear to be in order. Such low-tech improvements will be less expensive and easier for the Russians to operate and maintain.

The United States might also consider providing early warning monitors or intruder detection systems for heightened perimeter and storage building security. Another option would be to furnish computers so central inventory records could be maintained in a computerized database. To address the problem of "brain drain" of Russia's chemical weapons expertise, the United States might set up employment and aid projects under the umbrella of the CTR program, similar to those set up for Russia's nuclear experts.

In addition, U.S. officials might also constructively engage Russian authorities in a dialogue about response and recovery procedures to be used in the event of an attack or theft of chemical weapons. The U.S. Army routinely conducts vulnerability assessments of U.S. storage facilities. Response plans are tailored to each site and troops train and practice drills to test them and ensure readiness in the event of an actual theft or attack.⁷⁷ Such capabilities and experience would be well worth sharing with Russian authorities.

In the midst of a struggle to bring federal spending under control, Congress correctly has its sights focused on improving government services to U.S. citizens at the lowest practicable cost. Such an intense focus on domestic matters can often result, however, in proposals that win points with the voters but in the end weaken U.S. national security. For example, some in Congress have called for cuts in the CTR program as a whole.⁷⁸ Others in Congress have proposed reducing funds for assistance to Russia's chemical weapons destruction program or have sought to portray certain CTR programs, such as those geared toward conversion of defense facilities, as ill-conceived. Such proposals are short-sighted.

The CTR program is an astute investment in U.S. and international security. U.S. security interests are being well served by aiding the security and dismantlement of former Soviet nuclear weapons, and funds should not be diverted from the important tasks that the CTR has underway in order to attend to security at Russian chemical weapons storage facilities.

The measures recommended above could yield substantial improvements in the security of Russia's chemical weapons stockpile, and exorbitant sums would not be required to enact them. Given the line crossed by Aum Shinrikyo and the political and economic circumstances in the former Soviet Union, the U.S. Senate would be prudent to set aside additional funds for assistance to reinforce security at these sites. The price of assisting Russia now is much lower than the cost that may be incurred later if this problem is not promptly addressed.

⁷⁷ *Military Police: Chemical Agent Security Program*, Army Regulation 190-59, 22, 25, 31-33.

⁷⁸ For fiscal year 1996, the Clinton administration requested \$371 million for the CTR program. The House of Representatives cut this request by \$171 million, the Senate by \$6 million. As of this writing, House and Senate conferees had not arrived at a final decision about CTR funding.

Dismantling the Soviet/Russian Chemical Weapons Complex: An Insider's View

Dr. Vil S. Mirzayanov

The following pages tell of my personal journey and of a chemical weapons development program that went unchecked. While many people are aware of some of the details associated with this story, they do not know that I am a stalwart supporter of the Chemical Weapons Convention (CWC) as the most viable way to bring this particular program or, for that matter, any other runaway chemical weapons development program, under control. Without the CWC, I fear such programs will continue to endanger mankind.

In the last year, the ratification of the CWC has been under consideration in the U.S. Senate and the Russian Duma. Differing views about ratification exist in both countries, so politics will undoubtedly influence their actions. Given the consequences of this important decision, American and Russian legislators and citizens should do their utmost to set politics aside in this instance. U.S. and Russian decisions about the CWC's ratification will mean either the fruitful entry into force of a crucial disarmament and nonproliferation treaty or the beginning of its gradual disintegration.

If the United States does not ratify the CWC, pushing Russia to do the same, Russia's chemical weapons programs will become less transparent, perhaps even completely closed. Although there is no organized political force in Russia opposing the CWC's ratification, some within the military and political ranks would like to revise the CWC. Their aim is to exclude the CWC's provisions that ban the development and testing of chemical weapons. These misguided people believe that military weapons, including chemical weapons, are the key to Russia's ability to remain a strong and respected country.¹

While such views are cause for apprehension, one must recognize that these individuals are poorly informed about the subject of chemical weapons and are clinging to old ways of thinking about how security can best be achieved. Initially, I too objected to the CWC, which I assessed as being inadequate for the task of eliminating chemical weapons. My lack of understanding about the CWC's provisions and my naivete about politics in general led me to advise against ratification of the CWC in a 24 March 1994 speech to the Duma and in articles published in Russia and in the West.²

¹ For example, a colonel of the General Staff of the Russian Armed Forces made remarks to that effect before a closed meeting of the Committee on Defense of the State Duma on 11 October 1994. Konstantin Kupreev, one high-ranking official of the Duma's Committee on International Affairs, has also expressed similar sentiments in a 9 February 1995 conversation with me.

² "Free to Develop Chemical Weapons," Vil Mirzayanov, *The Wall Street Journal*, 25 May 1994, p. A16; "Chemical Weapons: An Expose," Vil Mirzayanov, *Perspective*, vol. IV, no. 4, Institute for the Study of Conflict, Ideology & Policy, Boston University, April-May 1994, 1-4.

The Duma has held preparatory hearings on the CWC, despite my imprudent counsel, the rumblings of the ultra-nationalists, and the fact that President Boris Yeltsin has not yet transferred the CWC to the Duma for formal consideration. In fact, the Duma Committee on Defense has stated its general approval of the CWC. This committee found that Russia's signature of the CWC:

conforms with the new foreign policy of Russia...Chemical disarmament meets in full measure the national interests of Russia since it provides for the destruction of obsolete stocks of chemical weapons that present a real danger to the population and to the environment. Destruction of chemical weapons will not affect national security and will have no impact on the defense capability of the country. Ratification of the Convention should be regarded as part of the overall process of disarmament.³

In addition to such statements, the Defense Committee has urged the Russian government to proceed promptly with the planning and other activities that will enable Russia to implement the CWC.

Such encouraging developments should not be mistaken as signs that Russia will move forward with the CWC before the United States does. I am certain that if the U.S. Senate does not consent to ratify the treaty, the Russian Duma surely will not approve it. As already noted, this scenario would probably doom the CWC to failure.

The Evolution of My Views

For some, such views are a notable departure from what I have said before and what they expected to hear from a veteran of the Soviet chemical weapons complex. Many people think that they know my story—what I have done and why I did it—but, given the rumors and confusion swirling around me, perhaps it is best that I tell it myself.

For twenty-six years, I worked at the State Scientific Research Institute of Organic Chemistry and Technology (GosNIIOKhT) in the heart of Moscow.⁴ I began as a scientist working in a laboratory with sophisticated equipment to monitor the air, water, and other emissions from this facility. In my final position at GosNIIOKhT, I was the Chief of the Department of Counteraction against Foreign Technical Intelligence. For much of my career, my duties involved the security of all new projects at GosNIIOKhT and the chemical weapons complex as a whole. Accordingly, I strived to ensure that this work would go undetected by foreign intelligence services. I had state-of-the-art equipment at my disposal, and my job offered

³ 11 October 1994 Resolution of the Committee on Defense, State Duma of the Federal Assembly of the Russian Federation, "On the Course of Preparation of the Russian Federation for the Process of Destruction of Chemical Weapons and for Ratification of the 'Convention on Prohibition of Development, Production, Stockpiling and Use of Chemical Weapons and On Their Destruction'," 2-3.

⁴ GosNIIOKhT actually had four branches. The Moscow branch, which employed 500-600 scientists and a total of about 3,500 people, was the largest. The Volgograd branch specialized in research on soman and new binary agents, while the Shikhany branch worked on the synthesis and testing of new agents. A fourth branch was located at Novocheboksarsk, along with a large chemical weapons production facility.

me unique opportunities for creative scientific work. My years at GosNIIOKhT were the most rewarding of my scientific career.

I was somewhat surprised to discover, however, the extent to which our efforts to protect these programs succeeded. When I first went public with statements about the development of new chemical agents in October 1991, I was stunned to learn that U.S. Government officials really did not appear to know what was going on inside the Soviet and later the Russian chemical weapons complex.

I unmasked the policies and activities of the Soviet/Russian chemical weapons complex for several reasons. First, I witnessed the duplicity of Soviet officials during the CWC negotiations. Although the United States stopped producing and testing chemical weapons and signed an agreement with the Soviet Union to that effect in June 1990, the USSR did not stop such work.⁵ The main reason that the Soviets did not stop their developmental work is that the United States had succeeded in developing, testing, and producing a binary chemical weapon.⁶ GosNIIOKhT's leadership was compelled to pursue an analogous capability—a Soviet binary.

In other words, the USSR intensified the development and testing of the most modern class of chemical weapons during the final stages of the CWC's negotiations. These events took place during the period of "perestroika," when Moscow was doing its utmost to demonstrate its peaceful intentions, welcoming new arms control proposals and loosening its iron grip over Eastern European satellite states. For many Soviets, however, perestroika meant a lack of food, clothing, and housing. The USSR was asking for foreign loans to make ends meet. For me, this was a hypocrisy of the greatest order: Internationally, the Soviet government pretended to have stopped producing chemical weapons, while domestically it funded a program to develop those very weapons at the expense of its own citizens.

At about this time, the top officials ordered the escalation of a program known by the secret codename "novichok," which in Russian means newcomer. This research resulted in a new class of Soviet binary chemical weapons.

The Soviets actually began their research program to develop a new generation of chemical agents back in the mid-1970s. In 1978, they completed construction of a large facility in Novocheboksarsk that had the capacity to make up to 20,000 tons of chemical agents annually.⁷ The Novocheboksarsk facility would later produce a total of about 15,000 tons of a

⁵ In the U.S.-Soviet Bilateral Destruction Agreement, both states agreed to stop producing chemical weapons and to reduce their respective chemical weapons stockpile to no more than 5,000 metric tons. These reductions were to have been finished by 31 December 2002, but the revised date has the bilateral destruction process beginning by 30 June 1997 and ending by 30 June 2004. This treaty has not yet entered into force and has verification procedures similar to those in the CWC.

⁶ In a binary chemical weapon, the two component chemicals are mixed just prior to the weapon's arming or detonation to create a lethal agent. In unitary chemical weapons, such as the nerve gases VX, tabun, soman, and sarin, the chemicals are combined during the manufacturing process so that the agent is at its full potency from the outset. Binary weapons are considered safer since the components can be stored separately. The United States halted production of its binary, called the Bigeye, in 1990.

⁷ This facility is very large, but as far as I know, it has never actually operated at its full capacity.

chemical agent called Substance 33, which is similar to the nerve agent VX. The Soviet Army gave its official approval to a new unitary chemical agent known as A-230 in 1988. Yet a third new unitary agent called A-232, which was similar to agent A-230, was also developed but never received the Soviet Army's approval. Testing of these new agents took place at Shikhany and in Nukus, Uzbekistan. These agents were produced only in limited "experimental" quantities.

These three agents—Substance 33, A-230, and A-232—were the springboard for the development and testing of the novichok binary weapons. The first novichok agent to receive Soviet Army approval was novichok-5, which under optimal conditions exceeds the effectiveness of VX by five to eight times. Novichok-5, which was based upon A-232, was developed by GosNIIOKhT's scientists and tested in 1989 and 1990 at a large facility in Nukus. The binary variant of Substance 33, which was tested at Nukus and Shikhany, was officially adopted by the Soviet Army as a chemical weapon in 1990. The developments associated with the novichok program are presented in Table 2.

These achievements—in particular the success of the binary based upon Substance 33—were celebrated in 1991 by the most senior officials in the USSR. President Mikhail Gorbachev presented the Soviet Union's highest award, the Lenin Prize, to GosNIIOKhT's Director, Victor Petrunin, the Vice-Commander of the Soviet Chemical Forces Gen. Anatoly Kuntsevich, and his successor, Gen. Igor Yevstavyev.

One should be mindful that the chemical components or precursors of A-232 and its binary version novichok-5 are ordinary organophosphates that can be made at commercial chemical companies that manufacture such products as fertilizers and pesticides. In my opinion, this research program was premised on the ability to hide the production of precursor chemicals under the guise of legitimate commercial chemical production of agricultural chemicals. Inspectors would have a difficult time uncovering this covert Soviet chemical weapons production program since no outsiders knew that these new chemical agents even existed.⁸ To me, this situation was ominous: It could have been the basis for undermining the verification regime being shaped in the Geneva negotiations.

Furthermore, neither the Soviets nor the Russians revealed any of these activities under the terms of a bilateral Memorandum of Understanding that was designed to promote mutual transparency of chemical weapons programs and to test proposed verification procedures.⁹ Even worse, although the June 1990 Bilateral Destruction Agreement had not been approved by either country and therefore had not entered into force, the continued testing and production of chemical agents by the Soviet and Russian governments amounted to a grave violation of that agreement.

⁸ The CWC bans known chemical agents and specifies them by name on Schedule 1. The CWC catalogs the other chemicals that it controls -- mostly the precursors to agents -- on Schedules 2 and 3. *Variants* of the chemicals involved in the binary program are currently on these Schedules, but the individual chemicals themselves are not specified by name.

⁹ The Wyoming Memorandum of Understanding, signed on 23 September 1989, provided for both countries to engage in a voluntary, cooperative program of data exchanges and trial verification experiments. The first data exchange took place at the end 1989, the second early in 1994. Each side conducted seven trial inspections in conjunction with the first data exchange and five following the second.

Table 2: Mirzayanov's Account of the Novichok Program

Name of Agent	Type of Agent	Research Program	Test Site	Production Site	Status
Substance 33	<ul style="list-style-type: none"> Unitary agent Similar to nerve agent VX Novichok precursor 	Site: GosNIIOKhT (Moscow)	Shikhany	Novocheboksarsk	<ul style="list-style-type: none"> 15,000 tons produced Declared as VX under terms of Wyoming MOU^a
A-230	<ul style="list-style-type: none"> Unitary agent Novichok precursor 	Site: GosNIIOKhT (Shikhany) Lead Researcher: Pyotr Kirpichov	Nukus	Shikhany and Volgograd	<ul style="list-style-type: none"> Tested 1988-1989 Adopted as chemical weapon 1990 Experimental quantities produced (tens of tons)
A-232	<ul style="list-style-type: none"> Unitary agent Similar to A-230 Novichok precursor 	Site: GosNIIOKhT (Shikhany) Lead Developer: Pyotr Kirpichov	Nukus and Shikhany	Shikhany and Volgograd	<ul style="list-style-type: none"> Experimental quantities produced (a few tons) Not approved by the Army
Novichok-5*	<ul style="list-style-type: none"> Binary agent Based on A-232 5-8 times more effective than VX 	Site: GosNIIOKhT (Moscow) Lead Developers: Igor Vasiliev and Andrei Zheleznyakov ^b	Nukus	Shikhany and Volgograd	<ul style="list-style-type: none"> Tested 1989-1990 Experimental quantities produced (a few tons) Approved as chemical weapon 1989
Novichok-#? No established name	<ul style="list-style-type: none"> Binary agent Based on Substance 33 	Site: GosNIIOKhT (Moscow and Shikhany)	Nukus and Shikhany	Novocheboksarsk and Shikhany	<ul style="list-style-type: none"> Tested 1988-1989 Adopted as chemical weapon 1990 Experimental quantities produced (tens of tons)
Novichok-7 ^c	<ul style="list-style-type: none"> Binary agent 10 times more effective than similar nerve agent soman 	Site: GosNIIOKhT (Moscow) Lead Developer: George Drozd	Shikhany	Shikhany	<ul style="list-style-type: none"> Tested 1993 Experimental quantities produced (tens of tons)

^a The 1989 Wyoming Memorandum of Understanding is a bilateral confidence-building agreement signed by the United States and the USSR, providing for reciprocal data exchanges and trial on-site inspections.

^b Andrei Zheleznyakov was mortally wounded in a laboratory accident during the development of novichok-5.

^c The number of the novichok agent does not necessarily mean that other novichok agents, either numerically before or after this agent, exist.

I had hoped that this pattern of behavior would change as new democratic norms and institutions took hold in Russia. At first, it looked as though this would happen. Yeltsin made several statements about the importance of keeping arms control commitments made by the Soviet Union and of destroying our inherited chemical weapons stockpile safely. He also formed a new Presidential Committee on Biological and Chemical Weapons to oversee the dismantlement of these military complexes and weapons in accordance with treaty provisions. Yeltsin erred by appointing the same group of officials who had run the chemical weapons complex under the Soviet system to this important committee. Kuntsevich, for example, chaired the presidential committee. After a while, I realized that behavior patterns were not changing and the level of my protests gradually increased.

The first overt signs of my disillusionment with this situation came in 1989 when I helped to organize a branch of the Democratic Movement of Russia within GosNIIOKhT. In May 1990, I ended my membership in the Communist Party. Thereafter, the authorities denied me access to my laboratory equipment and several of my closest colleagues were transferred elsewhere. In short, they began to try to isolate me.

Next, on 10 October 1991, I published an article in the newspaper *Kuranty* wherein I attempted to draw public attention to the dangerous and deceiving policies of the chemical weapons complex.¹⁰ This article was a *cri de coeur*, a cry from my heart. To my dismay, few inside Russia and even fewer abroad paid any attention to my warnings. More dramatic events associated with the USSR's disintegration overshadowed my revelations about the development of new chemical agents. I tried personally to persuade the leaders of the Democratic Movement of Russia that the chemical weapons complex would continue this dangerous activity if its leaders were not confronted. GosNIIOKhT, I noted, was conducting hazardous work that grossly violated ecological standards and threatened the safety of hundreds of thousands of Muscovites. Even when I told them that the storage facilities at GosNIIOKhT contained enough chemical agents for a second Chernobyl, my warnings went unheeded.

The only ones paying attention to my actions were the leaders of the chemical weapons complex, who fired me on 6 January 1992.¹¹ Because of a legal technicality, I was not arrested at that time, but I was forced to eke out a living by selling goods at Moscow's flea market. During chance encounters with my former GosNIIOKhT colleagues, I learned that the same policies and practices that I had spoken out against were still being pursued. I was angered, but not surprised, to learn that GosNIIOKhT's employees had spent an entire year falsifying technical documents about the work done at Novocheboksarsk. They were scrambling to create proof for international inspectors that the Novocheboksarsk facility was producing the agent VX, when in fact it was producing Substance 33, the VX-like agent.¹²

These circumstances, among others, convinced me that I had to raise the level of my protests. On 16 September 1992, I co-authored an article with Lev Fyodorov that appeared in the

¹⁰ This article is titled "Inversion."

¹¹ To show how little had changed since the collapse of the USSR, I was fired according to Stalinist custom, after open general meetings of the various departments of GosNIIOKhT wherein people expressed their opinions and demanded my punishment.

¹² The Novocheboksarsk facility may have also been producing the binary that is based upon Substance 33.

Moscow News, a weekly publication. I also gave interviews to Western and Russian reporters wherein I stated my grave concerns about the direction of the Russian chemical weapons program.¹³ This time, the Russian Federal Counterintelligence Service (FCS), formerly the KGB, did not look the other way. On 22 October 1992, I was arrested and imprisoned in Lefortovo, the infamous KGB prison in downtown Moscow. I was charged with revealing state secrets, although anyone who reads my articles or other public statements can see that I have been careful not to disclose technical details about the program.¹⁴

The authorities found no secret information in my possession, despite a thorough search of my apartment.¹⁵ After eleven days in jail without access to my defense attorney, I was released on the condition that I not leave Moscow. What became clear was that those prosecuting me were less concerned with protecting state secrets than with making an example of me. To wit, as I prepared my defense, I was legally allowed to copy numerous top secret documents—many of which I had never seen before—and distribute them to my attorney, the press, and others abroad who were denouncing my persecution.

A dispute with Nicolai Sazanov, the judge who had jurisdiction over my case, resulted in my being imprisoned a second time. In this instance, I went to jail because I protested Sazanov's refusal of my request to declare the list of unpublished states secrets illegal.¹⁶ As my case wound its way through the Russian legal system, it garnered a great deal of international attention.¹⁷ Had it not been for the protests of numerous scientific and human rights organizations in the United States, Germany, Great Britain, Holland, Canada, Italy, Sweden, and elsewhere, I have no doubt that I would still be in prison. After more than three weeks in jail,

¹³ See Will Englund, "Ex-Soviet Scientists Says Gorbachev's Regime Created New Nerve Gas in '91," *The Baltimore Sun*, 16 September 1992, A3; Will Englund, "Russia Still Doing Secret Work on Chemical Arms," *The Baltimore Sun*, 18 October 1992, A1; and Oleg Vishnyakov, "Backstage Story: Binary Bomb Exploded. First Victim Arrested by State Security. Can a State Crime Be a Departmental Secret? Chemical Weapons Are Banned, But Is the Military Continuing With Chemistry?" *Novoye Vremya*, 22 October 1992, 4-9.

¹⁴ These charges were based on a resolution of GosNIIOKhT's Permanent Technical Commission. One member of this commission, Professor Georgi Drozd, judged these charges to be unfounded and refused to sign the resolution. At one meeting of the commission, Drozd recalled that GosNIIOKhT's Deputy Director, Alexander Martynov, who was also a colonel in the FCS, told the group that I would never be freed and therefore there was not much need for proof of the charges being brought against me.

¹⁵ More than fifty top secret documents, many of which had not previously been in my possession, somehow appeared among my files at work. For example, though I had never officially had access to the project that developed and tested the novichok-5 agent, one document detailed my technical assignment to this program. The record of the list of the individuals admitted to this project shows that I never took part in this work.

¹⁶ This unpublished list was the basis for the charges against me, yet the judge refused to allow me and my attorney access to this list. His ruling was in direct violation of Paragraph 3, Article 15 of the Russian Constitution. When I argued that at least I was not guilty of the crime of violating the Constitution, on 27 January 1994 I was arrested again. This time, I was treated as a dangerous criminal, hand-cuffed and escorted by dogs. See Sonni Efron, "Russian Whistle-Blower Calls Closed Trial 'a Crime'," *The Los Angeles Times*, 26 January 1994, A12.

¹⁷ Among the many articles written about my plight were Serge Schmemmann, "K.G.B.'s Successor Charges Scientist," *The New York Times*, 1 November 1992, A4; Gale Colby, "Fabricating Guilt," *The Bulletin of the Atomic Scientists*, vol. 49, no. 8, October 1993, 12-13; Sonni Efron, "Russian Scientist Faces Trial for Chemical-Arms Report," *The Los Angeles Times*, 5 January 1994, A6; Fred Hiatt, "Russian Court Opens Unprecedented Secrets Trial," *The Washington Post*, 25 January 1994, A1.

I was released on 22 February 1994. Then, on 11 March 1994, acting Prosecutor-General A. Ilyushenko closed my case due to "absence of evidence of the crime."

My attorney advised me to press for further resolution of my case in order to set a legal precedent. In all likelihood, the case would have gone all the way to the Russian Supreme Court and could have helped to propel legal and civil progress in Russia. As the father of two young sons, I could not in good conscious pursue this matter, even though President Yeltsin promised me amnesty if the decision was unfavorable.¹⁸ Furthermore, I did not wish to continue with this ordeal since I had committed no crime. My innocence was underscored when the People's Court of Moscow's Perovsky district ordered GosNIIOKhT and the federal Prosecutor-General's Office to pay me thirty million rubles for financial and moral damages.¹⁹ I have yet, however, to receive any compensation, and GosNIIOKhT has filed a countersuit against me for moral and financial damages in the amount of 33 million rubles.

Amidst all of this legal maneuvering, things did not stand still within the chemical weapons complex. In the Fall of 1993—months after Russia signed the CWC—Professor Georgi Drozd successfully completed testing the binary novichok-7 at the Shikhany test site. Novichok-7 is approximately ten times more effective than soman but has similar volatility. While the program was in full operation, so-called "experimental" quantities of these new agents were produced for testing purposes. The quantity of these new agents that was produced—a few tens of tons, at most—is not significant in the military sense.²⁰ Two experimental production facilities were built at Shikhany and Volgograd, but full-scale production facilities, like the one built at Novocheboksarsk for Substance 33, were not built for any of the new agents. Moreover, there is very little chance that Russia will further develop or produce any of the new chemical agents. Russia's continuing economic crisis means that the government can simply no longer afford to fund these programs at their previous high levels.

Though I have not worked at GosNIIOKhT since January 1992, I have remained in contact with several colleagues who are still employed within the chemical weapons complex. These individuals tell me that the signs of deterioration within this program are evident—approximately fifty percent of the scientific personnel in the research and development institutes like GosNIIOKhT have been laid off from their jobs. As many as ninety percent of those involved with producing chemical agents lost their jobs when production stopped.

Furthermore, Yeltsin fired Kuntsevich on 7 April 1994 from his position as the chairman of the President's Committee on Biological and Chemical Weapons. Little, if anything, has improved since Kuntsevich's departure. Pavel Pavlovitch Syutkin, previously Kuntsevich's

¹⁸ In 1993, one of Yeltsin's closest advisors made a verbal promise to me to this effect.

¹⁹ Fred Hiatt, "Russian Court Rules Against Government," *The Washington Post*, 9 June 1994, A22.

²⁰ While a very small amount of agent can have a devastating effect on unprotected civilians, a few tens of tons of chemical agent is not necessarily significant in the tactical or strategic sense for a military attack, especially against a well-equipped and trained opponent. For example, to contaminate a parcel of land 72 square kilometers in size, 21.2 metric tons of the nerve agent VX would have to be dispersed twice a day, meaning over 43 metric tons would be required daily for this one area. Or, to achieve 50 percent contamination of 1 square kilometer of ground using mustard gas, over 134 metric tons of mustard gas would need to be dispersed per day. See Victor A. Utgoff, *The Challenge of Chemical Weapons: An American Perspective* (New York: St. Martin's Press, 1991), 238, 240.

deputy, now heads the committee. Syutkin, however, is no more competent or motivated to oversee the dismantlement of the chemical weapons complex than his former boss.

The Dangers of Chemical Weapons

Nuclear weapons were used only on two Japanese cities at the end of World War II. In comparison, chemical weapons were used often on World War I battlefields and as recently in the 1980s Iran-Iraq War, when helpless citizens were sometimes the targets of chemical attacks. Nuclear weapons demolish everything in the vicinity of the explosion, but chemical weapons, perhaps even more insidiously, kill or injure the living, leaving buildings standing. Still, for some reason, chemical weapons are thought of as old-fashioned and are not perceived as being as abhorrent as nuclear weapons.

Chemical weapons are not useful strategically and are of marginal use tactically, especially against well-equipped and trained troops. However, chemical weapons are quite effective against an unprotected civilian population.²¹ What would the reaction have been, for example, had Saddam Hussein used chemical weapons against Israeli citizens?²² More recently, Japanese citizens have been the victims of indiscriminate poison gas attacks in the subways of Tokyo and Yokohama.²³ These events have not only shaken the entire country of Japan, they have provided a high-profile example of the utility of chemical weapons for terrorist purposes.

Accordingly, it is more important than ever that we proceed with the safe destruction of existing chemical weapons stockpiles. Nowhere is the need to attend to this matter more evident than in Russia, where the Duma's Committee on Defense has classified "the condition of [Russia's chemical weapons] storage facilities and of most chemical warfare products" as an "emergency or near-emergency." According to this committee, "By the expected time of the actual start of the process of chemical weapons destruction, that is by 2003-2007, all facilities and all types of products will be in a state of emergency."²⁴

Security and accounting procedures within Russia's chemical complex can be described as primitive, at best.²⁵ Though there are fences and guards at these facilities, such factors are

²¹ Even a few molecules of poison gas may be enough to produce unpredictable genetic changes that can manifest themselves through several generations. See Valentin Tarasov and Ludmilla Kalinina, "Principles of Assessing Mutagenic and Carcinogenic Danger of Poison Gas and of Products of Their Degradation and Biotransformation," Paper presented at the NATO International Conference on Chemical Weapons, Kaliningrad, February 1995.

²² In the aftermath of the Persian Gulf War, inspectors from the United Nations Special Commission found that, in addition to bombs and missiles filled with mustard gas and the nerve agents tabun and sarin, Iraq had loaded 14 Al-Hussein missiles with binary agent warheads. Another 336 bombs were filled with binary agent. *Chemical Weapons Convention Bulletin*, no. 13, September 1991, 22.

²³ The Tokyo attack took place on 20 March 1995, killing 12 and injuring 5,500. The Yokohama attack on 19 April 1995 sent over 250 to the hospital.

²⁴ See the 11 October 1994 Resolution of the Committee on Defense, op cit., 4.

²⁵ Russian officials cannot precisely account for how much chemical agent was made or how many weapons have been transferred from one location to another. In a closed meeting of the Duma Defense Committee on 11 October 1994, A.S. Obukhov, the General Director of Scientific Production Association "Basalt" admitted that with approximately four million Russian chemical munitions having been produced, it was virtually impossible to keep track of this arsenal in

no hindrance to desperate individuals who will do anything to make money. Given the instability and corruption that permeate contemporary Russia, one cannot rule out the possibility that some will seek to profit by smuggling out chemical weapons for sale on the black market, as others have tried to do with nuclear materials.

In short, I fear that the danger of chemical weapons proliferation or theft far exceeds the danger of foul play with the nuclear arsenal of the former Soviet Union. I strongly recommend that security at these storage sites be improved and the appropriate steps taken to prevent these weapons from falling into the wrong hands.

Russia's stockpile is also a ticking ecological time bomb. Soviet officials amply demonstrated their disregard for public safety by callously operating chemical weapons production facilities with little protection for the health of the facilities' workers, neighbors, and the surrounding environment. After some time at GosNIIOKhT, I realized that basic safety standards were routinely being violated, that workers were frequently being contaminated with chemical agents while on the job.²⁶ Top-ranking officials within the military-chemical complex were aware of these circumstances, but did not take measures to upgrade safety. It should be of little surprise, therefore, that citizens greeted their government's plans to destroy the chemical weapons stockpile with skepticism and fear.²⁷

Their apprehensions appear to have been well-founded. The top officials in the chemical weapons complex tried to destroy surreptitiously the new binary agents that had been produced. From 1993 to 1994, they destroyed this material by detonating the binaries in the open air at the Shikhany test site, near the city of Saratov. Since they used no safety precautions whatsoever—simply exploding the binary shells and allowing the wind to carry away their poisonous contents—this barbaric destruction program hardly went unnoticed. The health of local citizens was tremendously harmed, and, justifiably, they are angry.²⁸ The Presidential Committee must bear a great deal of the responsibility for allowing this unsafe destruction effort to proceed. Had the CWC been in force, I would note, this material would have been safely destroyed under international supervision.

Given these circumstances, the most extensive safety precautions possible must be used to destroy Russia's chemical weapons stockpile. If not disposed of properly, air currents can transport particles and fine dust containing chemical agents over long distances, literally hundreds

a precise manner. It was not unusual to hear about guards that did not keep accurate records of weapons transfers, who "guestimated" how many munitions were in a shipment rather than actually counting them. Such an environment is conducive to foul play.

²⁶ For example, my analysis of the smokestack gases emerging from the Volgograd chemical weapons production facility revealed that these emissions regularly exceeded the permissible amount of nerve agent air emissions by 80 to 150 times, while the plant's water effluents were almost 1,000 times over the allowed concentration level.

²⁷ For example, in 1989, Soviet officials hailed their chemical weapons destruction facility at Chapayevsk as a state-of-the-art prototype, but citizen protests about the safety at the plant blocked operation of the facility. Karen Elliott House, "Toxic Dump," *Wall Street Journal*, 25 February 1993, A6.

²⁸ Vladimir Petrenko, "Response to General Danilkin's statements of 21 July 1994," Russian Green Cross, Program on The Environmental Legacy of the Cold War, Project Chemtrust-2, 1995.

of miles, exposing humans, animals, and the environment to possible contamination.²⁹ Russia's current blueprint calls for the chemical weapons to be destroyed by a two-step process, beginning with neutralization. Bilateral tests of Russia's proposed neutralization technology are now underway with U.S. government experts. While Russian authorities must gain the approval of U.S. and international experts, it is vitally important that they also begin to build a bridge of mutual understanding with the communities where these weapons are located. The Russian government should supply these communities with the information necessary for a full appraisal of their plan and the technologies to be used.³⁰ Without the involvement and consent of the public, the Russian destruction program will meet with citizens' resistance at every juncture.

CWC Ratification Needed

To the best of my knowledge, the development, testing, and production of chemical weapons has stopped in Russia, partly because of the aforementioned economic circumstances and partly as a result of the attention I drew to the situation. However, one unintended side-effect of my revelations about the binary program is that they have provoked doubt in some quarters about the wisdom of proceeding with ratification of the CWC. Having seen this system from the inside, I am thoroughly convinced that a ban on chemical weapons must be established and that the CWC is the vehicle to accomplish that goal.

What I did not understand when I first spoke out on these issues is that the CWC's negotiators built flexibility into the CWC to permit it to adapt to new scientific and technical developments. This adaptability was prudent because science does not stand still. The treaty contains provisions to permit additions to the list of banned and controlled chemicals and to improve inspection techniques and technologies to keep pace with such developments.³¹ When Russia ratifies the CWC, the international community will have the right to inspect—extensively, frequently, and on a challenge basis, if needed—the facilities involved in the binary program. In the end, I am confident that the international authorities can get to the bottom of this matter through this process and that the appropriate additions will be made to the list of chemicals. Contrary to my initial assessment, I now understand that the CWC provides the means to bring the Russian chemical weapons complex under international monitoring. If the CWC's procedures are not instituted, the Russian chemical weapons complex will remain accountable only to the same clique of leaders, who have thus far not proven their trustworthiness.

²⁹ For more on how chemical contaminants can be transported through the air, see Marjatta Rautio, et al., *Air Monitoring As A Means for Verification of Chemical Disarmament: C.2. Development and Evaluation of Basic Techniques* (Helsinki: Ministry of Foreign Affairs, 1985) and *Air Monitoring As A Means for Verification of Chemical Disarmament: C.4. Further Development and Testing of Methods* (Helsinki: Ministry of Foreign Affairs, 1987).

³⁰ Independent scientists should play a constructive role in this review, and citizens would be better equipped to make decisions if the media helped disseminate information to the public about the technologies under consideration. Several Russian and American colleagues support this type of collaborative, problem-solving approach between the Russian government and the local communities.

³¹ I note with approval the plans to involve outside scientific experts in such evaluations. Article VIII of the CWC, paragraphs 21 (h) and 45, requires the Director-General of the Technical Secretariat to set up a Scientific Advisory Board with experts in scientific fields pertinent to the CWC's implementation.

Russia itself must take steps beyond ratifying and implementing the CWC to address the situation brought about by the existence of these new agents. In September 1992, Yeltsin signed Resolution 508-RP, which prohibits the export of chemical agents and their precursors. Those in charge of the chemical weapons complex purposefully drafted this resolution so that it did not list the chemicals involved in the binary program—namely Substance 33, the novichok agents, and the precursors for these agents. This situation must be rectified by adding the chemicals concerned to those prohibited from export to ensure that Russia's domestic nonproliferation provisions are as strong as possible.

Next, because I believe chemical weapons development, testing, and production have come to a halt, many qualified chemists and other specialists can no longer support themselves and their families. Those in the West who are concerned about the proliferation of chemical weapons should be more aware of the latent dangers created by this situation. These scientists may be persuaded by irresponsible regimes to use their skills to help with the clandestine development and production of chemical weapons.³² To forestall a "brain drain" from the now mostly defunct Russian chemical weapons complex, it would be advisable to provide some assistance to these displaced chemical weapons experts. Such assistance might consist of grants to pursue scientific research unrelated to chemical weapons or training for new jobs in the civilian sector. Under the Nunn-Lugar program, similar assistance has been made available to nuclear weapons experts.

By now it is fairly common knowledge that Russia does not have the technical or financial means to destroy its chemical weapons stockpile on its own. Because of traditional security ties, Russia will continue to look to the United States for assistance with this difficult task, but other European countries are discussing what contributions they might make in this regard. For example, Germany has already begun a cooperative technical assistance program. Such assistance will undoubtedly be crucial to the safety and success of Russia's chemical weapons destruction program.

Conclusion

Leaders around the globe, but particularly in the United States and Russia, must muster the political will to address the problems associated with chemical weapons—how to destroy them safely, how to stem their proliferation, how to establish an international norm against their possession, and how to create an environment of cooperative security to take the place of states' reliance upon chemical weapons. The key to confronting all of these problems lies in the CWC; there is no time to waste in ratifying and implementing this important treaty. Without the CWC, there will be no control of security, storage, or continued development of chemical weapons.

³² For example, whether purposefully or not, the Russian government may have facilitated the establishment of a conduit for the transfer of chemical weapons related knowledge and/or materials by signing an October 1992 agreement with Syria to create the Syrian Center of Ecological Protection. The Syrian center mainly works on the synthesis of polymer sorbents for the purification of water, air, and the environment. Russia has shipped the center at least seven laboratory cabinets, vacuum pumps, and other laboratory equipment, all of which could be used for purposes other than environmental work. This information came from my long-time GosNIIOKhT colleague, Professor Georgi Drozd, who worked for the individual in charge of the agreement's negotiation and implementation, General Kuntsevich, and is intimately familiar with the situation. On 4 April 1994, the FCS told Drozd and ten others summoned as witnesses that criminal charges were to be filed against Kuntsevich for suspicion of attempting to illegally export precursors for the synthesis of chemical warfare agents. The investigation of this matter continues.

The terrorist use of chemical agents in Japan this past spring should serve as ample warning that the global community can no longer ignore the problems that chemical weapons present. The consequences of doing so may be unpredictable and tragic.

Cooperative Threat Reduction Support to the Destruction of Russia's Chemical Weapons Stockpile

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The Cooperative Threat Reduction (CTR) Program is an effort to enhance the national security of the United States through cooperative engagements with Russia, Belarus, Kazakhstan, and Ukraine aimed at diminishing the threat posed by weapons of mass destruction along with their associated delivery systems. The Nunn-Lugar initiative establishing the CTR Program was a direct response to the political and economic uncertainties associated with the disintegration of the former Soviet Union that called into question the ability of the newly independent states to provide for the safe and secure transportation, storage, and eventual reduction or complete elimination of these weapons. With respect to chemical weapons, the objective of the CTR Program is to "jump-start" the Russian chemical weapons destruction program, specifically in the area of nerve agent destruction and thus to contribute to Russia's ability to meet the destruction milestones of the Chemical Weapons Convention. In addition, the accelerated destruction of the chemical weapons stockpile reduces the likelihood of the proliferation of these weapons.

This essay begins with a description of Russia's chemical weapons stockpile and a brief history and status report on Russia's chemical weapons destruction program. Next, the origins and organization of the CTR program are described before the discussion moves on to the activities, accomplishments, and plans for the programming related to Russia's chemical weapons destruction effort.

An Overview of the Russian Chemical Weapons Stockpile

After the Soviet Union splintered, the Russian Federation assumed responsibility for the former Soviet chemical weapons stockpile and treaty commitments related to it. The Russian stockpile is the largest declared stockpile in the world, consisting of 40,000 metric agent tons. Organo-phosphorous based nerve agents make up the majority of the stockpile (81%) with the balance comprised of blister agents (19%). The Russian stockpile contains three types of nerve agents: sarin, soman, and VX. In addition, the Russian stockpile contains thickened or viscous versions of the soman and VX agents. Thickened agents, comprising approximately 16% of the chemical weapons stockpile, are only used in air-delivered munitions. The arsenic-based agent lewisite constitutes the majority of the declared Russian blister agent stockpile with only very small portions of the stockpile consisting of mustard and a mustard/lewisite mixture.

Chemical agents in the Russian stockpile are contained in projectiles, rocket warheads, bombs, spray devices, SCUD missile warheads, and bulk storage containers. The majority of the blister agents are stored in large (50 cubic meter) bulk storage containers. All the nerve agent is weaponized, contained in either artillery munitions (projectiles or rocket warheads) or air-delivered munitions (bombs, spray devices, or missile warheads). There are a greater number of ground-based weapons as opposed to air-delivered munitions, but the air-delivered weapons represent the majority of the stockpile on an agent-tonnage basis. The stockpile is stored at the seven locations

shown in Figure 1. Except for Shchuche,¹ all of the storage locations are west of the Ural mountains. Only one type of chemical weapon is principally stored at each installation: Kambarka and Gorny store bulk blister agents; Kizner and Shchuche are primarily nerve-agent-filled artillery munitions storage installations; and Pochep, Leonidovka and Maradykovsky store nerve agent-filled air-delivered munitions.



Unlike the U.S. chemical weapons stockpile, none of the Russian chemical weapons reportedly contain explosive components such as bursters, fuzes, or rocket motors. These components are stored separately from the agent-filled munitions. Another key difference between the Russian and U.S. chemical weapons is that the U.S. weapons were "pressed-fit" during assembly, while the Russian weapons were welded. Therefore, the U.S. approach of reverse assembly² is not applicable for Russian chemical agent-filled projectiles. Finally, the presence of thickened or viscous agents in the Russian stockpile could make draining these munitions more difficult than if the munition had been filled with unthickened versions of the same agent.

¹ Shchuche is also commonly spelled Shchuch'ye.

² "Reverse Assembly" is the method used to drain chemical agent-filled projectiles at the U.S. chemical weapons destruction facilities. The process involves unscrewing the nose closure/lifting lug, extracting the pressed-fit burster well using an expandable collet and then inserting a drain probe to remove the agent under vacuum. Since the burster well of the Russian nerve agent-filled projectiles are welded to the munition casing it cannot be readily extracted. Therefore, an alternative must be used to access the chemical agent contained in the munition.

Status of Russian Chemical Weapons Destruction Efforts

Although Russia does not currently operate an industrial-scale chemical weapons destruction program, the Ministry of Defense (MOD) has previously used a mobile destruction process called KUASI to destroy 4,000 leaking munitions containing approximately 200 metric tons of nerve agents. The KUASI system employed a two-step destruction process that involved neutralizing the chemical agent with an organic reagent³ and then incinerating the resulting agent mass. The KUASI system was demonstrated to the members of the United Nations Conference on Disarmament in 1987.

Planning for destruction of the main chemical weapons stockpile began in the 1986-1989 time-frame when the demonstration facility near the town of Chapayevsk in the Kuybyshev Region was designed and constructed. The destruction process used in this facility was based on the two-step technology first employed in the KUASI mobile destruction system, but modified to meet the through-put requirements of an industrial-scale facility. Because of reported opposition from local officials arising from concerns about inadequate safety and environmental protection measures, the Chapayevsk facility was never commissioned and has never processed any chemical-agent-filled munitions.

In February 1992, President Boris Yeltsin established the Committee on Conventional Problems of Chemical and Biological Weapons of the Russian Federation.⁴ Commonly referred to as the President's Committee, it is responsible for organizing Russia's chemical weapons disarmament efforts. In October 1992 this Committee submitted a Program to the State Duma⁵ for the phased destruction of Russia's chemical weapons. The document described an approach for destroying the blister agent stored at Kambarka and Gorny in Phase I, and for the nerve agent-filled artillery munitions stored at Kizner and Shchuche in Phase II. Destruction of the air-delivered munitions stored at Pochep, Leonidovka, and Maradykovsky was not discussed. This plan proposed on-site destruction of the blister agent stored at Kambarka and Gorny, and relocation of the nerve agent-filled artillery munitions stored at Kizner and Shchuche to Novocheboksarsk, in the Chuvash Republic. There, they would be destroyed in a converted former VX production facility.

The State Duma returned the program plan to the President's Committee in March 1993, requesting that a more comprehensive plan be prepared and resubmitted that would encompass the entire chemical weapons stockpile. One of the main concerns about the original plan was the collocation of the chemical weapons stored at Kizner and Shchuche to Novocheboksarsk. This objection was raised by the Representatives from the republics that the collocated munitions would travel through enroute to Novocheboksarsk. After March 1993, many of these republics passed laws prohibiting the transportation of chemical weapons through their territory. These laws

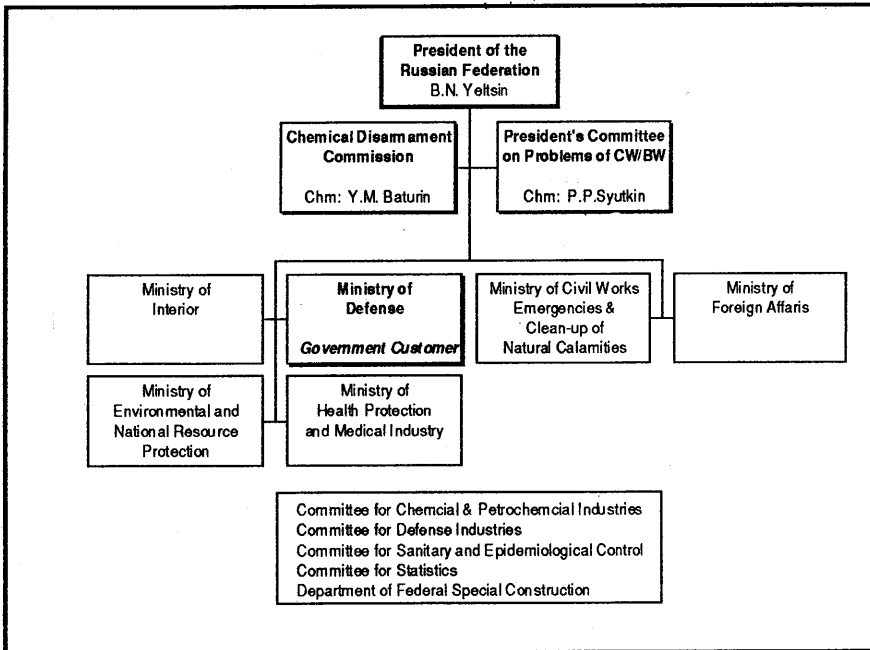
³ The reagent used for mustard, sarin, and soman was monoethanolamine (MEA). A mixture of ethylene glycol and phosphoric acid was used for VX.

⁴ Presidential Decree #160, 19 February 1992, Establishment of the Committee for Conventional Problems of Chemical and Biological Weapons Under the President of the Russian Federation.

⁵ The State Duma is roughly equivalent to the House of Representatives in the United States Congress.

apparently convinced Moscow that chemical weapons destruction--or at least detoxification of the agent--would need to be accomplished where the agent/munitions are stored.

In March 1995, a Presidential Decree mandated that all chemical weapons in Russia be destroyed in facilities specifically built for this purpose and located in the regions where the weapons are currently stored.⁶ This statement clearly acknowledged the anxiety caused by the



October 1992 plan. Moscow's intention was to alleviate the concerns of the other regions through which chemical weapons would be transported or destroyed in their territories. In addition, the decree stated that chemical weapons destruction would be funded through a separate line item in the federal budget, thus helping to ensure that all moneys budgeted for chemical weapons

Figure 2: Key Russian Government Organizations Associated with Chemical Weapons Destruction

destruction were used for this purpose and not diverted to other programs. Finally, the Decree delineated the roles and responsibilities of 12 executive branch ministries and committees in the area of chemical weapons disarmament (e.g., destruction and treaty compliance) and established an Interdepartmental Commission on Chemical Disarmament. This new commission, to be headed by National Security Advisor Yuri M. Baturin, would be responsible for coordinating the executive branch's efforts in such areas as administering the funding appropriated for chemical weapons disarmament. Within the executive branch of the Russian Government, the MOD was designated the "Government Customer" responsible for the development and operation of the destruction facilities, along with maintaining the safe storage of the weapons until their destruction. In other words, the Russian MOD and U.S. Department of Defense (DOD) now have analogous responsibilities for the destruction of their respective chemical weapons stockpiles.

Treaty Obligations

In January 1993, both the United States and the Russian Federation, along with 128 other nations, signed the Convention on the Prohibition of the Development, Production, Stockpiling

⁶ Presidential Decree #314, 24 March 1995, Preparing the Russian Federation for Fulfilling Its International Obligations in the Field of Chemical Disarmament.

and Use of Chemical Weapons and on Their Destruction, commonly referred to as the CWC. The CWC prohibits the development, production, stockpiling, transfer and use of chemical weapons as well the provision of assistance to any states attempting to pursue these activities. Additionally, the signatories agree to destroy existing chemical weapons stockpiles within the specified timeframe shown in Table 3.

Table 3: Key Chemical Weapons Convention Destruction Milestones

Phase	Entry Into Force (EIF) Milestone (Years)	Destruction Requirement
1	EIF + 2 EIF + 3	<ul style="list-style-type: none"> ◆ Complete testing of its first destruction facility ◆ Not less than 1% of declared stockpile (on agent tonnage basis)
2	EIF + 5	<ul style="list-style-type: none"> ◆ Not less than 20% of declared stockpile
3	EIF + 7	<ul style="list-style-type: none"> ◆ Not Less than 45% of declared stockpile
4	EIF + 10	<ul style="list-style-type: none"> ◆ 100% of declared stockpile

In helping Russia destroy its chemical weapons stockpile, the CTR program supports the principal objective of the CWC that a country's entire stockpile be destroyed within 10 years after the CWC enters into force, which will occur 180 days after the 65th signatory country submits its document of ratification to the United Nations. Although the destruction objectives are clearly stated, the CWC also specifies that chemical weapons destruction operations need to be carried out using environmentally safe methods. The CWC also provides for extensions, up to a maximum of five years, subject to a decision by the Conference of State Parties. A treaty party may request an extension if it believes it will be unable to meet the ten-year deadline.

The Cooperative Threat Reduction Program

The political and economic conditions that accompanied the disintegration of the Soviet Union at the end of 1991 called into question the ability of the newly independent states (NIS) of the former Soviet Union to maintain effective control over their arsenals of weapons of mass destruction (WMD). Political, social, and economic upheaval heightened the prospects that the former Soviet republics would not be able to provide for safe and secure storage or disposition of these weapons. Although significant positive changes were occurring in the NIS and many of the threats that confronted the United States throughout the Cold War were disappearing, these weapons and materials continued to pose a risk to U.S. national security interests.

Congress responded to these conditions and associated threats by initiating the CTR program in November 1991. Often referred to as the Nunn-Lugar program after the senators who spearheaded the effort, this bipartisan congressional initiative authorized DOD to assist eligible states of the former Soviet Union in weapons dismantlement and destruction. The CTR program is not traditional foreign aid; rather, it is defense by other means. The CTR program is a unique

approach to mitigating the dangers associated with the WMD in the NIS and for helping to reduce the possibility that these dangers will rise again in the future. The United States' objectives in the CTR program as established by Congress are to cooperate with the NIS to:

- ◆ destroy weapons of mass destruction;
- ◆ transport, store, disable, and safeguard weapons in connection with their destruction;
- ◆ establish verifiable safeguards against the proliferation of such weapons;
- ◆ prevent diversion of weapons-related expertise;
- ◆ facilitate demilitarization of defense industries and conversion of military capabilities and technologies; and,
- ◆ expand defense and military contacts between the United States and the NIS.

CTR Program implementation is managed and directed by the CTR Program Office within the Office of Dr. Harold P. Smith, Assistant to the Secretary of Defense (Atomic Energy). Established in May 1994 by direction of the Secretary of Defense, my program office coordinates the development of long-range plans with policy direction from the Assistant Secretary of Defense (International Security Policy) and executes those plans through the Defense Nuclear Agency (DNA). To a lesser degree, the On-Site Inspection Agency (OSIA), the U.S. Army Program Manager for Chemical Demilitarization,⁷ and the U.S. Army Corps of Engineers are also involved. The CTR Program Office establishes a single focal point within DOD for all program implementation matters and provides the structure and oversight necessary for effective and efficient program management. DNA is responsible for actual project execution, and, along with OSIA and the Army, provides the professional staff to turn policy and legislative direction into tangible, on-the-ground assistance. This work includes supporting the audits and examinations process to ensure that CTR assistance is being used for the purposes intended, in accordance with legislative mandates.

Through the CTR program, DOD provides equipment, services, and technical advice to Russia, Belarus, Kazakhstan, and Ukraine to assist them in the safe and secure transportation, storage, and eventual elimination (or in the case of Russia, the reduction) of the remaining Soviet-era weapons; to prevent proliferation; to dismantle the associated infrastructure; and to help transform portions of the infrastructure into peaceful civilian assets. In each of fiscal years 1992 and 1993, Congress authorized DOD to transfer \$400 million from existing DOD accounts to support the Nunn-Lugar program. Subsequent

⁷ After a recent reorganization, the U.S. Army Chemical Materiel Destruction Agency (USACMDA) is now known as PMCD.

legislation in fiscal years 1994 and 1995 provided for direct appropriations of \$400 million each year.⁸

CTR Chemical Weapons Destruction Support Program

Although CTR's emphasis has been on nuclear weapons and fissile materials, the dangers inherent in the Russian chemical weapons stockpile and the challenges in destroying it have made CTR efforts to assist Russia's chemical weapons destruction efforts a key element in America's multi-year strategy to help dismantle former Soviet weapons of mass destruction. The CTR Chemical Weapons Destruction Support program was established on 30 July 1992, when DOD signed an agreement with the President's Committee concerning the safe, secure, and ecologically sound destruction of chemical weapons.⁹ This agreement stipulated a funding limit of \$25 million to accomplish five tasks: develop a concept plan for the Russian chemical weapons destruction program; conduct a familiarization (intern training) program; host visits to U.S. chemical weapons destruction facilities; provide chemical weapons detectors, systems for analysis, and alarms; and provide tutorials and demonstration of protective equipment. The agreement also contained a provision for additional support to the Russian chemical weapons destruction program at the discretion of DOD. Such support could include the creation of a national laboratory, joint evaluations related to chemical weapons destruction, and other mutually-agreed support. In March 1994, an amendment to the July 1992 agreement was signed by DOD and the President's Committee that increased the funding limit from \$25 to \$55 million.

The objective of the CTR Chemical Weapons Destruction Support Program is *not* to achieve the complete destruction of the Russian chemical weapons stockpile—that goal is beyond the scope of the CTR program both in terms of cost and time. Rather, the CTR program is focused on jump-starting the Russian chemical weapons destruction program, specifically in the area of nerve agent destruction, and thus contributing to Russia's ability to meet the destruction milestones of the CWC. The program is focused on the destruction of Russia's nerve agent stockpile because these weapons represent the greatest threat to U.S. security interests. The nerve agent is weaponized, not in bulk storage containers, and these munitions comprise over 80% of the entire Russian chemical weapons stockpile. Through CTR assistance, it is hoped that the two-step technology selected by Russia will be proved out, the necessary pilot and/or demonstration activities will be completed, and a full scale destruction facility will be started and ideally begin

⁸ In January 1995, the CTR Program Office published a multi-year CTR Program Plan in response to congressional direction in the fiscal year 1995 National Defense Authorization Act. The plan describes CTR activities and funding requirements beginning with fiscal year 1996 and concluding at the end of fiscal year 2001.

⁹ Agreement Between the Department of Defense of the United States of America and the President's Committee on Conventional Problems of Chemical and Biological Weapons of the Russian Federation Concerning the Safe, Secure and Ecologically Sound Destruction of Chemical Weapons, signed 30 July 1992.

through-put operations. With this kind of jump start and the resulting lessons learned, Russia will be much better prepared to carry out destruction operations at the other storage facilities and continue down the path of CWC implementation.

To meet the objective of the CTR Chemical Weapons Destruction Support Program, the four-tier program illustrated in Figure 3 has been developed. This program culminates with the design and construction of a destruction demonstration facility for nerve agent-filled artillery munitions. Russia is expected to use the experience gained from this first nerve agent destruction facility, once it has begun operations, to complete the destruction of its remaining nerve agent stockpile. Annual plans of work are developed jointly between DOD, the President's Committee, and the MOD to delineate the roles and responsibilities of each party in accomplishing agreed tasks. These plans of work also serve as the basis for developing statements of work for supporting contractual efforts.

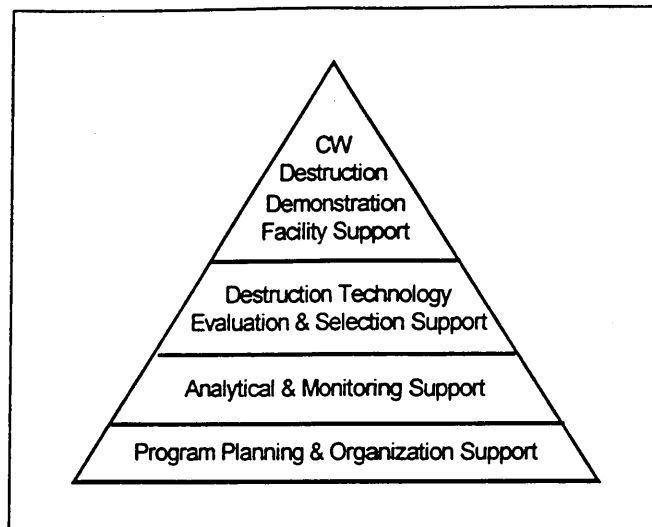


Figure 3: CTR Destruction Support Program

Naturally, there is a desire and expectation to begin moving earth and building structures immediately. Nevertheless, chemical weapons destruction is an enormously complicated task and one that receives a great deal of scrutiny by the public, both here in the United States as well as in Russia. The success of such a program is dependent on the quality of planning and preparation that forms the foundation for more visible progress such as constructing destruction facilities. Consequently, much of the initial efforts of the CTR Chemical Weapons Destruction Support Program has focused on working with the President's Committee and the MOD to jointly develop this foundation, while at the same time constantly looking for areas of cooperation that could accelerate the start of destruction activities. Objectives and activities under each of the tiers -- from base to apex -- are as follows:

The first objective is to provide assistance to the Russian government in the organization and planning for the destruction of the declared nerve agent stockpile. This tier of the support program has two goals: to develop a common technical basis for all cooperative efforts and to ensure that there is a detailed and well-defined plan for the destruction of the Russian chemical weapons stockpile. The first element is being achieved through a variety of activities (e.g., visiting destruction facilities, conducting intern familiarization programs, and developing a bilingual glossary of chemical weapons-related terminology to help avoid miscommunications). The second element is being

accomplished by the joint development of a comprehensive implementation plan for the Russian chemical weapons destruction program.

The Chemical Weapons Destruction Support Office (CWDSO) was established in Moscow in June 1993 to serve as the in-country technical focal point for U.S. support to the Russian chemical weapons destruction program. The CWDSO provides U.S. government and contractor personnel with a fully-equipped facility to meet and work with their Russian colleagues in a less formal environment where the technical details and issues associated with chemical weapons destruction can be addressed and resolved in a business-like fashion. The CWDSO has also developed a bilingual glossary of chemical weapons terminology and performs the majority of the translations (both English-to-Russian and Russian-to-English), thus helping to ensure the accuracy and consistency of the translation and resulting discussions.

A number of visits to U.S. destruction facilities and to the U.S. Chemical Demilitarization Training Facility at Aberdeen Proving Ground, Maryland, have been conducted for members of the President's Committee and MOD. Several members of the State Duma, as well as local officials of communities near some of the Russian chemical weapons storage installations, have also participated in these visits. The visitors have been shown the extensive amount of planning and preparation that goes into the design, construction, and operation of a chemical weapons destruction facility. They also demonstrate that chemical weapons destruction can be accomplished in a safe and environmentally sound manner. As part of this effort, in July 1994 a group of U.S. engineers and safety and environmental specialists visited the Chapayevsk site to become more familiar with Russian facility concepts for chemical weapons destruction.

From September 1993 through March 1994, six Russian chemists and engineers participated in an intern familiarization program conducted at the Aberdeen training facility. During their stay, the interns received classroom training and "on-the-job" training in Aberdeen as well as the U.S. chemical weapons destruction facilities in Tooele, Utah, and on Johnston Island in the Pacific Ocean. In addition, many of the interns attended town-hall meetings with local citizens from communities near proposed United States chemical weapons destruction facilities. These activities familiarize the Russians with the technical, legislative, and management aspects of the U.S. chemical weapons destruction program so that they can apply these experiences, as appropriate, to the Russian program. Several of these interns will also be working with U.S. personnel on the joint evaluation of the Russian nerve agent neutralization reactions described later in this paper.

In May 1994, a contract was awarded to a U.S. contractor team led by Bechtel National Incorporated (BNI) to prepare the comprehensive implementation plan for the Russian chemical weapons destruction program. Representatives from both the President's Committee and the MOD participated in the Source Selection and Evaluation Board that recommended the BNI contractor team. The comprehensive implementation

plan is intended to provide a detailed and well-defined plan for the destruction of the Russian chemical weapons stockpile, describing program cost and schedule, the basis for destruction technology and facility location selection, design criteria for the destruction facilities, results of the site characterization of the proposed locations for the future chemical weapons destruction facilities, public outreach and education programs, and recommendations for an emergency preparedness program.

In February 1995, DOD accepted a Russian suggestion to rescope the comprehensive implementation plan in a phased approach that more closely parallels MOD's approach for its chemical weapons destruction program. Rather than addressing the entire Russian chemical weapons destruction program at the outset, initial work will focus on the first destruction facility for nerve-agent-filled artillery munitions. Following a meeting with local officials from the Kurgan regional administration and the town of Shchuche in July 1995, a protocol was signed authorizing the selection of a site for a pilot chemical weapons destruction facility and authorizing the MOD to prepare a feasibility study for the creation of the facility.¹⁰ Based on this agreement, the implementation plan for the Shchuche pilot chemical weapons destruction facility will be completed by mid-1996. The balance of the comprehensive implementation plan could be undertaken in 1996 as work on the Shchuche destruction facility gets underway.

The second objective of this overall program is to assist in the development of industrial and chemical agent analytical and monitoring procedures for use at the declared nerve agent storage and destruction facilities. Chemical agent and environmental monitoring at and in the area surrounding a chemical weapons destruction facility is a critical element of any chemical weapons destruction program. Not only is this information necessary for the facility operators, but it is necessary to address public concerns about the impact and safety of chemical weapons destruction activities. This capability must be in place prior to the start of destruction operations so the necessary personnel can be trained and an environmental baseline established that would be used to assess the impact of chemical weapons destruction operations. The second tier of the CTR Chemical Weapons Destruction Support Program addresses this requirement by helping to establish a central chemical weapons destruction analytical laboratory (CAL). The CAL will be responsible for developing chemical agent analytical and monitoring procedures for use at the destruction and storage facilities; training chemical weapons destruction and storage personnel; serving as the quality assurance/quality control center for the destruction and storage analytical and monitoring efforts; and conducting analysis of environmental samples comparable to an Environmental Protection Agency certified laboratory.

Although an agreement in principal was reached in March 1994 when the amendment to the 30 July 1992 agreement was signed, substantive work on the CAL was

¹⁰ PROTOCOL of the Meeting in Shchuche, Kurgan Region, Concerning the Review of the Request Made by A.B. Chubais, Head of the Government of the Russian Federation Dated 17 July 1995, No. ACh-P7-21183, 27 July 1995.

delayed until a location for the laboratory was approved and the necessary permits received. In April 1995, the President's Committee informed DOD that building 14 at the Moscow State Scientific Research Institute of Organic Chemistry and Technology (GosNIIOKhT) had been selected as the location for the CAL. A U.S. facility assessment team visited GosNIIOKhT in May 1995. Negotiations are currently underway between U.S. and Russian technical experts to develop a mutually agreed concept for refurbishing building 14. The CAL is expected to be operational by the end of 1997.

In addition to the refurbishment of building 14 at GosNIIOKhT, DOD is procuring three mobile laboratories for use at the storage installations. These mobile labs are similar to the real-time analytical platforms that DOD uses at its chemical weapons storage installations. They will provide the MOD with the capability to monitor the interior of a munition storage building before it is opened (i.e., "first-entry monitoring"), as well as perform environmental monitoring of the area surrounding the storage installation. Acceptance testing and operating training will begin in January 1996, followed by delivery of the mobile laboratories to Russia. These mobile labs are expected to be operational by May 1996.

The third major objective of CTR assistance in this area is to assist in the evaluation, selection, and development of the destruction technologies that will be used to destroy the declared nerve agent stockpile. The major obstacle in helping jump-start the Russian chemical weapons destruction program has been the absence of a Russian decision on a destruction technology. In February 1994, the U.S. provided a copy of the design package for the Newport Indiana, chemical weapons destruction facility. The design package was provided to the MOD and President's Committee as a cost-effective method for destroying U.S. bulk munitions and containers that could be adapted readily for the Russian nerve agent-filled air-delivered munitions. In May 1994, the President's Committee indicated to the United States that direct incineration would not be acceptable in Russia. In September 1994, the MOD and President's Committee informed DOD that a two-step destruction process involving chemical neutralization with organic reagents, followed by a treatment process called bituminization, had been selected as Russia's national chemical weapons destruction technology for nerve agent-filled munitions. The United States has very little information about industrial-scale neutralization of chemical agents with organic reagents. The Army had used aqueous sodium hydroxide to neutralize sarin in the late 1970s and early 1980s, but had encountered various difficulties that contributed to the decision to adopt direct incineration as the U.S. destruction technology. In addition, the United States had no information on the bituminization process proposed to treat the substance generated as a result of the neutralization reaction. Following intensive bilateral discussions in November 1994, it was agreed that a U.S.-Russian joint evaluation of the two-step nerve agent destruction process would be conducted.

This joint evaluation will occur in two phases. The first phase was conducted at the U.S. Army Edgewood Research, Development and Engineering Center located at

Aberdeen Proving Ground, Maryland, from May to August 1995. U.S. nerve agents were used during these tests. The second phase will occur at the Saratov Military Engineering College of Chemical Defense, using Russian nerve agents from October through November 1995. The evaluation consists of three 50-gram tests for each of the three types of nerve agent contained in artillery munitions: sarin, soman, and Russian VX. For sarin and soman, the same neutralization reaction that had been used with the KUASI system, monoethanolamine, will be used. For VX, the Russians have chosen a new neutralization reaction using potassium isobutylate. The CTR program provides for identical analytical equipment to be available in both laboratories for the joint evaluation and ensures that personnel receive the necessary training to operate the equipment properly. Both U.S. and Russian environmental and safety criteria are being used to evaluate the destruction process, and limited engineering data is also being collected to assist in the follow-on design efforts.

The final objective of the Chemical Weapons Destruction Support Program is to assist in the design and construction of a chemical weapons destruction demonstration facility. Based on the results of the technology evaluation, it is DOD's intention to ask Congress for funding to assist in the design and construction of a pilot chemical weapons destruction facility at Shchuche. This facility would effectively realize the CTR objective of jump-starting the Russian program by providing Russia with a demonstrated chemical weapons destruction process/technology that could be used to destroy the remaining nerve agent-filled chemical munitions. The qualifier "pilot" is used merely to connote that it may be necessary or desirable for the facility to begin with a lower initial destruction capacity that could be expanded later by adding modular process lines after successful demonstration of the initial process line. After expansion, the full-scale facility would be capable of destroying the remaining nerve agent-filled artillery munitions stored at Shchuche within three years.

A separate CTR implementing agreement will be negotiated for DOD assistance in the design and construction of the destruction facility. The agreement will clearly stipulate DOD and Russian roles and responsibilities and will provide for specific linkage between DOD assistance and Russian performance.

A U.S. integrating contractor will be hired to provide the assistance in the design and construction of the destruction facility. DOD can only obligate funds that are legally available for this purpose. Consequently, funding for the contract will be provided in annual increments, subject to congressional appropriation and annual certification that the specific conditions in the agreement are being met.

Conclusion

This paper has provided an overview of the CTR program and, more specifically, its role in helping to jump-start the Russian chemical weapons destruction program. The on-going United States effort to destroy its own chemical weapons stockpile proves how

difficult and immense the task can be. Russia, with a stockpile of 40,000 metric tons of chemical agents, faces an even greater task, one compounded by the terrible condition of the Russian economy. The assistance from the CTR program will play an important role in the Duma's decision to ratify the CWC, and in the Russian effort to destroy their chemical weapons stockpile.

Admittedly, work has not proceeded as rapidly as hoped. However, strides have been made, and events over the last six months indicate that the progress of this cooperative endeavor should improve both in pace and in substance. The technical and political complexities associated with chemical weapons destruction as well as the funding structure of the CTR program will continue to challenge both countries in this effort. Nevertheless, we must not lose sight of the fact that Russia's 40,000 metric ton stockpile is the largest in the world and U.S. national interests are served very well by helping Russia rid the world of these weapons of mass destruction.

The United States, Russia, and Chemical Weapons Disarmament: Choices Ahead

Amy E. Smithson

Although some U.S. security concerns about Russia eased with the end of the Cold War, other concerns and complications have arisen. While the United States no longer truly fears that Russia would wage chemical warfare against America or its allies, U.S. policy makers still face decisions regarding the chemical weapons expertise and arsenal that Russia inherited from the Soviet Union.

The United States negotiated with the Soviet Union bilaterally and in an international forum to conclude agreements that would initiate and monitor the process of chemical weapons disarmament. Common wisdom held that the U.S. Senate would quickly approve such accords. After all, a decade ago Congress mandated the destruction of the U.S. chemical weapons stockpile; the U.S. military finds these weapons repugnant and of no strategic value and little utility on the battlefield; and the public has long viewed chemical warfare as abominable. Then, charges surfaced that Russia was harboring a chemical weapons development program of Soviet origin. These allegations have caused some in the Senate to have second thoughts.

The first section of this essay provides a history of the international and bilateral routes that have been taken toward the prohibition and elimination of chemical weapons, focusing on developments in the past few years. The next segment of the essay reviews the factors that have managed to throw both paths off course. In the closing section of the essay, the analysis addresses the path most likely to help the United States achieve its stated goals regarding chemical weapons nonproliferation and disarmament. The concluding section also speaks to whether continued U.S. assistance to Russia for chemical weapons destruction is advisable, given U.S. concerns about a possible covert chemical weapons program.

The Puzzle and Its Pieces

In 1960, 18 nations began what would turn out to be a long quest for a treaty to ban the development, production, stockpiling, and use of chemical weapons, known as the Chemical Weapons Convention (CWC). Compared to the headline-grabbing U.S.-Soviet nuclear arms control talks, the CWC negotiations in the Conference on Disarmament (CD) were a sleepy backwater. More delegations joined the CWC negotiations as the years passed. By the time the CWC was concluded in 1992, 39 nations were at the negotiating table in Geneva, with another 40 observing the process.

Two issues in particular bedeviled the negotiators at the CD. The first was a vast commercial industry that worked with "dual-use" chemicals to manufacture everyday products such as fertilizers, pharmaceuticals, textile dyes, and ceramics. These chemicals could also be used, however, to make the very blister and nerve agents that the negotiators sought to ban. The second issue was how to prohibit chemical weapons development, yet allow states to maintain

their defense preparedness. States needed to be able to continue to conduct defensive research, but the difference between defensive research and offensive development activities can be hard to discern. Both of these areas would make compliance with treaty obligations very difficult, at best, to verify.

In 1984, then-Vice President George Bush presented a proposal designed to tackle the verification problems inherent in the CWC. Bush proposed any time, any place inspections. These challenge inspections would buttress the CWC's data declarations and routine inspections with a short-notice inspection of any commercial, research, or other site suspected of engaging in prohibited activities.¹ The delegations at the CD were stunned. While the United States had long advocated on-site inspections, such measures had yet to be incorporated into any superpower arms control agreement. In the multilateral CD, the concept of challenge inspections was, to say the least, revolutionary.

As the CD delegations began to digest Bush's proposal, they started to receive more assistance from representatives of the chemical industry, which picked up its level of involvement in the negotiations. Chemical industry provided pragmatic advice about how to structure the data declarations and conduct inspections. Working to see the CWC's objectives reached in a way that protected their proprietary interests, industry representatives also offered their facilities for tests of the verification procedures under consideration.²

Iraq's use of chemical weapons during the Iran-Iraq War of the 1980s underlined the need to strengthen the 1925 Geneva Protocol's norm against the use of chemical weapons. Since the Protocol's members are still allowed to develop, produce, and stockpile chemical weapons, the Protocol's trip wire barring states from using chemical weapons is considered to be thin.³ Moreover, many states that ratified the Protocol reserved the right to retaliate in kind against a

¹ For an overview of negotiations and the issues involved therein, see Victor A. Utgoff, *The Challenge of Chemical Weapons* (New York: St. Martin's Press, 1991); Brad Roberts, ed., *Chemical Disarmament and U.S. Security* (Boulder: Westview Press, 1992).

² The Chemical Manufacturers Association (CMA) was honored for its efforts in this regard on 8 May 1995, when the Lawyers Alliance for World Security and the Committee for National Security presented CMA with the W. Averell Harriman Award. For more on industry-related issues, see the testimony of Dr. Will B. Carpenter, Senate Foreign Relations Committee, *Hearings on the Chemical Weapons Convention*, 103d Cong., 2d sess., S.Hrg. 103-869 (Washington, D.C.: U.S. Government Printing Office, 1994), 88-92; U.S. Congress, Office of Technology Assessment, *The Chemical Weapons Convention: Effects on the U.S. Chemical Industry*, OTA-BP-ISC-106 (Washington, D.C.: U.S. Government Printing Office, August 1993); Amy E. Smithson, ed., *Implementing the Chemical Weapons Convention: Counsel from Industry*, Report No. 10 (Washington, D.C.: Henry L. Stimson Center, January 1994).

³ The Australian government formed an export control group in 1985 to restrict the flow of dual-use chemicals and thereby curtail their contribution to chemical warfare in this conflict. The Australia Group coordinates export control policies among supplier nations, with its participants assessing requests for such chemicals on a case-by-case basis. Gradually, the number of participants and chemicals controlled increased to over 25 and 50, respectively. See Julian Perry Robinson, "The Australia Group: A Description and Assessment," in *Controlling the Development and Spread of Military Technology: Lessons from the Past and Challenges for the 1990s*, eds. Hans Gunter Brauch, Henny J. Van Der Graff, John Grin, and Wim A. Smit (Amsterdam: Vu University Press, 1992), 157-76.

chemical attack,⁴ believing that deterrence of a chemical attack rested mainly with the threat of equal retaliation. The pace of the CD negotiations remained glacial, even in the face of Iraq's violation of the Geneva Protocol. This lack of responsiveness can be attributed largely to the fact that the two superpowers were still so far apart on the major issues of the negotiations, especially on verification. A promising sign that this gap would begin to close came with Soviet Premier Mikhail Gorbachev's April 1987 announcement that the Soviet Union had ceased producing chemical weapons.⁵ A major breakthrough occurred when the Soviet Union accepted the principle of challenge inspections in August 1987,⁶ but the negotiators continued to disagree about how to conduct such inspections.

To breathe more life into the CWC negotiations, the Soviet Union and the United States began to accelerate a parallel track of negotiations. First, the two superpowers sought to demonstrate that the verification procedures proposed for the CWC were workable and tolerable. In September 1989, Secretary of State James Baker and Soviet Foreign Minister Edward Shevardnadze met in Jackson Hole, Wyoming, to sign a Memorandum of Understanding. Therein, both parties *voluntarily* agreed to two phases of data exchanges and reciprocal practice inspections. The USSR declared possessing a chemical weapons stockpile of 40,000 metric tons in the data exchanged at the end of 1989. The first phase trial inspections took place the next year at two production facilities, three storage facilities, and two industrial chemical facilities in each country.

The United States declared a stockpile of approximately 30,000 metric tons and inaugurated its destruction program in mid-1990 at a pilot plant on Johnston Atoll in the Pacific Ocean. The U.S. Army initiated this program under a November 1985 congressional mandate to destroy over 95 percent of the aging U.S. stockpile unilaterally.⁷ The U.S. Army selected incineration as the method to destroy the stockpile at eight sites in the continental United States where it is stored. Controversies associated with the safety of incineration brought resistance from some citizens at these sites, but this program has maintained its slow forward momentum under the careful oversight of the U.S. National Academy of Sciences and numerous federal regulatory agencies.⁸

⁴ The United States, which did not ratify the Geneva Protocol for 50 years, was among the nations that attached this condition. For a complete list, see U.S. Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of the Negotiations* (Washington, D.C.: U.S. Arms Control and Disarmament Agency, 1990), 16-19.

⁵ Gorbachev made this announcement on 10 April 1987 in Prague. Edward M. Spiers, *Chemical Weaponry: A Continuing Challenge* (New York: St. Martin's Press, 1989), 127.

⁶ U.S. Arms Control and Disarmament Agency, "Chronology of Events Leading to the Signing of the Chemical Weapons Convention," Fact Sheet (Washington, D.C.: U.S. Arms Control and Disarmament Agency, 5 January 1993). The USSR's concession on this matter, which was announced on 6 August 1987, coincided with similar progress in a bilateral negotiation that produced the 1987 Intermediate-Range Nuclear Forces Treaty. Not that long thereafter by the 1990 Conventional Forces in Europe Treaty and the 1991 Strategic Arms Reduction Treaty. For a chronology of key developments in U.S. and Soviet/Russian Chemical Weapons Disarmament, see the appendix.

⁷ Public Law 99-145 ordered the destruction of all unitary chemical weapons by September 1994. At that time, the Army estimated the cost of the U.S. destruction program to be \$1.7 billion.

⁸ At present, the Army is exploring alternative technologies such as neutralization for possible use at two of the eight U.S. sites. For more on the controversies associated with the U.S. program, see Amy E. Smithson with the assistance of Maureen Lenihan, *The U.S. Chemical Weapons Destruction Program: Views Analysis, and Recommendations*, Report No. 13 (Washington, D.C.: Henry L. Stimson Center, September 1994). The first of the full-scale destruction facilities

In another effort to prod the CD negotiations along, the Soviet Union and the United States tried to convey their commitment to the goal of chemical disarmament through a Bilateral Destruction Agreement, known as the BDA. To the other CD delegations, it was fitting that the possessors of the world's two largest stockpiles would lead this process. The June 1990 BDA stipulated that the United States and the Soviet Union stop producing chemical weapons and reduce their respective stockpiles to no more than 5,000 agent tons. Each party would monitor the other's destruction process with the continuous presence of inspectors and monitoring instruments at destruction and storage facilities. Destruction was to begin no later than 31 December 1992 and be completed by the end of 2002.⁹ The BDA would be brought into force with the exchange of legal documents.

Saddam Hussein's threats to wage chemical warfare during the 1991 Persian Gulf War proved to be the final impetus needed to conclude the CWC. After the war, President Bush provided another incentive to the CD negotiators when he announced on 13 May 1991 that upon entry into force of the CWC, provided the Soviet Union was a participant, the United States would forswear the future U.S. use of chemical weapons for any purpose, including retaliation against a chemical attack. The entire U.S. arsenal would also be eliminated.¹⁰ Bush's action signified a major change from the accepted wisdom of how chemical attacks could best be deterred. Later testifying in support of the CWC's ratification, Chairman of the Joint Chiefs Gen. John M. Shalikashvili stated that even though the U.S. will not retaliate in kind, "it still retains a retaliatory capability second to none," and that the U.S. response to a chemical weapons attack would nonetheless be "absolutely overwhelming" and "devastating." Advanced conventional munitions would most likely be used.¹¹ Nations participating in the CWC negotiations took note of this total renunciation of chemical weapons by the United States.

In the spring of 1992, Australia also helped to reinvigorate the CD with a draft text of artful compromises on the major outstanding issues.¹² The CD negotiators worked through the summer to bring these marathon negotiations to a close, leaving the settlement of smaller operational details to a Preparatory Commission composed of the CWC's signatories. This final stage of the negotiations coincided with the Russian government's struggle to get on its feet in the aftermath of the Soviet Union's collapse. New Russian President Boris Yeltsin publicly committed Russia to abide by the international arms control agreements signed by the Soviet

is slated to begin operating this winter at Tooele, Utah.

⁹ The White House, "US-USSR Chemical Weapons Destruction Agreement," Fact Sheet (Washington, D.C.: Office of the Press Secretary, 1 June 1990).

¹⁰ "Chemical Weapons Arms Control, Chronology of Key Events: 1925-1992," Issues Brief (Washington, D.C.: U.S. Arms Control and Disarmament Agency, 1 April 1992), 8.

¹¹ "Testimony of Gen. John M. Shalikashvili" before the Senate Armed Services Committee, *Military Implications of the Chemical Weapons Convention (CWC)*, 103d Cong. 2d sess., S.Hrg. 103-835 (Washington, D.C.: U.S. Government Printing Office, 1994), 40-41, 43.

¹² For an account of the CWC negotiating endgame, see Amy E. Smithson, "Tottering Toward a Treaty," *Bulletin of the Atomic Scientists* 48, no. 6 (July/August 1992): 8-11; Amy E. Smithson, "Chemical Weapons: The End of the Beginning," *Bulletin of the Atomic Scientists* 48, no. 8 (October 1992): 36-40.

Union,¹³ and Moscow continued to participate in the CWC negotiations amid worsening economic circumstances.

Before long, the CD negotiators recognized that economic difficulties would make it difficult, if not impossible, for Russia to meet the CWC's 10-year deadline to complete destruction of chemical weapons stockpiles. They quickly added a provision to the CWC to allow a treaty party to apply for a maximum five-year extension to complete the destruction of a stockpile.¹⁴ In July 1992, the United States stepped in with \$25 million in technical assistance for the Russian destruction program.¹⁵ The negotiators also acknowledged that universal adherence to the CWC would take time. Therefore, they took the unprecedented step of building economic penalties into the CWC for states that do not join: Within three years after the CWC enters into force, nonparticipating states will lose access to some dual-use chemicals.¹⁶

In the end, the CWC's verification provisions were virtually identical to those in the BDA. Each called for data declarations, routine inspections, and challenge inspections. Under either treaty, inspectors have the authority to review a facility's records, interview personnel at the site, examine equipment, and take samples from such places as reactors, storage tanks, and waste streams. The CWC contains an explicit commitment to accept challenge inspections, and inspectors are to report any attempts to obfuscate or delay the progress of an inspection. Both accords require the destruction of former chemical weapons production facilities. However, a state may request permission to convert such facilities for peaceful uses. The conversion of a former production facility would be accompanied by stringent on-site inspections. While U.S. and Russian inspectors would implement the BDA, a new international monitoring agency, the Technical Secretariat, would be established in the Hague, the Netherlands, to administer the CWC and conduct its inspections.

When the CWC was opened for signature in mid-January 1993, Russia and the United States were among the initial signatories. Over 155 states quickly signed the CWC, so many assumed that it would not take long for 65 of those signatories to ratify the treaty and bring it into force. Considering Washington's role in creating the CWC, the United States was expected to be

¹³ Yeltsin has made four separate public statements -- two January 1992 speeches and two declarations, in April 1993 and March 1995 -- about Russia's intent to abide by Soviet-signed arms treaties and destroy Russia's chemical weapons.

¹⁴ Russia would submit its application for an extension to the Executive Council of the Organization for the Prohibition of Chemical Weapons (OPCW). This application must contain an explanation of why Russia needed additional time, as well as a detailed plan for accomplishing the destruction of the remaining weapons. If the request is approved, the OPCW will probably require additional verification measures. See the Chemical Weapons Convention, Annex on Implementation and Verification, Part IV (A), Section C, paragraphs 24-28.

¹⁵ The United States and Russia signed an agreement regarding the safe, secure, and ecologically sound destruction of the Russian stockpile on 30 July 1992. In his essay, Maj. Gen. Roland Lajoie (USA, Ret.) provides much more detail about the efforts of the Cooperative Threat Reduction program regarding chemical weapons destruction in Russia. For information about other aspects of the what is also known as the Nunn-Lugar program, see The White House, "Safe, Secure Dismantlement (SSD) Initiatives with Russia," Fact Sheet (Washington, D.C.: Office of the Press Secretary, 4 April 1993).

¹⁶ An overview of the CWC text is contained in Amy E. Smithson, ed., *The Chemical Weapons Convention Handbook* (Washington, D.C.: The Henry L. Stimson Center, 1993).

among the first to ratify.¹⁷ Moreover, because the BDA was concluded three years before the CWC, most assumed that the BDA would be activated even before the CWC.

Events have not unfolded that way. In fact, over the past two years, parts of this carefully constructed architecture have appeared to be on the verge of unravelling. The intervening political and economic difficulties that would continue to complicate Russia's efforts to keep its pledges would not be the only factor blocking progress.

Problems Within Russia

Just as the finishing touches were being put on the CWC, clouds of suspicion began to gather over the complex of facilities dedicated to chemical weapons research, development, and production that Russia inherited from the USSR. Scientists who worked inside the Soviet chemical weapons complex charged that the USSR had sponsored a robust chemical weapons research, development, testing, and production program in the late 1980s and early 1990s.¹⁸ During this same time period, the Soviet Union was participating in the negotiations to prohibit chemical weapons. Dr. Vil Mirzayanov contends that the Soviet Union's pledge to have halted chemical weapons production was broken when officials and technical experts at his scientific institute proceeded to develop a new generation of nerve agents. The "novichok" program focused on the development of binary chemical agents, which combine two chemical components just prior to detonation. According to Mirzayanov, the Soviets discovered, developed, tested, approved, and produced tens of tons of these new binary chemical agents. Not all of these activities, he says, ceased when the Russian government came to power.¹⁹

While it is worrisome—and politically damaging—that tens of tons of new binary agents may have been produced, the military significance of such quantities is questionable. For example, to defend a broad front for three days against a large-scale attack, 65 metric tons of VX would nominally be required to contaminate a strip of land that is 60 kilometers wide and 300 meters deep.²⁰ VX is a persistent nerve gas, meaning that it will remain operative for at least three days under good weather conditions. If a non-persistent agent like sarin or tabun were used,

¹⁷ Over 35 nations have ratified the CWC, including Austria, Australia, Finland, France, Germany, Greece, Japan, Mexico, Mongolia, Peru, Poland, Sweden, South Africa, Spain, Tajikistan, and Turkmenistan, among others.

¹⁸ Dr. Vil Mirzayanov was joined by a former weapons designer, Vladimir Uglev, and another scientist, Lev Fyodorov, in charging that new chemical agents were developed. Gale Colby, "Fabricating Guilt," *Bulletin of the Atomic Scientists* 49, no. 10 (October 1993): 12-13.

¹⁹ Mirzayanov's essay in this report provides greater detail on the novichok program.

²⁰ About 13,000 155-mm artillery rounds would be needed to deliver these 65 tons of VX. Contaminating an air base that is two square kilometers in size would require a total of 1.8 tons of VX, delivered in 0.3 ton increments by aircraft sorties twice a day for three days. These examples are taken from Anthony H. Cordesman's chart, "Typical War-Fighting Uses of Chemical Weapons," in his article, "One Half Cheer for the CWC: Putting the Chemical Weapons Convention in Military Perspective," in *Ratifying the Chemical Weapons Convention*, ed. Brad Roberts (Washington, D.C.: Center for Strategic and International Studies, 1994), 44. In this article, Cordesman analyzes the military significant and weaknesses of the CWC. On page 47, he states, "The weaknesses in the CWC are the kind of weaknesses that are unavoidable if any progress is to be made in negotiating and ratifying an effort to control chemical weapons. Although these weaknesses are sometimes significant, all can be contained or are of a nature that permits the faults of the CWC to be less threatening than a world without the CWC."

much larger quantities would be required for this one mission.²¹ Russia has firmly denied the accusations of a covert binary program, taking full advantage of the gray area between development activities, which the CWC will prohibit once in force, and research, which will not be banned.²²

Because no independent confirmation of the whistleblowers' accounts has been possible, no one outside of Russia has evidence of just how far across this gray area the Soviet Union, and perhaps Russia, strayed. Furthermore, no actual treaty violation has taken place since neither the CWC nor the BDA are in force. At the very least, however, it would appear that the Soviet government mocked the objectives of both of these treaties and is likely have broken its 1987 public pledge to have stopped producing chemical weapons. As for the Russian government's complicity, it is not known how far bureaucratic inertia and support from reactionary forces inside the chemical weapons complex carried the novichok program despite Yeltsin's public oaths to abide by treaty commitments. What is known is that the very individuals who blew the whistle on the novichok program strongly believe that U.S. Senate ratification of the CWC will significantly increase the opportunities to get to the bottom of this matter.

The extent of these activities and the current status of this program has been a matter of controversy and concern to U.S. policy makers and Members of Congress. Also of concern are the statements that began to appear questioning the accuracy of the declared size of Russia's stockpile.²³ The United States has sought clarification of these matters through the Memorandum of Understanding, but with insufficient satisfaction. In the data exchanged in May and June of 1994, for example, Russia reportedly declared only one chemical weapons research site.²⁴ U.S. officials can push only so far for clarification under the Memorandum of Understanding because it is a cooperative, not a legally binding document.

²¹ On a windy and rainy day, VX coverage is expected to last from 1 to 12 hours. Sarin coverage is expected to last from 1/4 to 4 hours on a sunny day with light breezes and 1/4 to 1 hour in inclement weather conditions. For more of a layman's discussion of the persistency of chemical agents, see Gordon M. Burck and Charles C. Flowerree, *International Handbook on Chemical Weapons Proliferation* (New York: Greenwood Press, 1991), 579.

²² Article VI of the CWC specifically allows states to produce and use a small quantity of toxic chemicals for research, medical, pharmaceutical, and protective purposes. Examples of medical and protective research include the development of vaccines and antidotes against chemical agents and the testing of protective equipment, like gas masks.

²³ For instance, Valery Menshikov, a consultant to the Russian Security Council, stated that Russia secretly destroyed an unknown quantity of chemical weapons because its stockpile was much larger than declared. Marcus Warren, "Russian Admits Deception on Chemical-Arms Stocks," *Washington Times*, 19 March 1994. Aleksey Yablokov, chairman of the Interdepartmental Commission for Ecological Safety of the Russian Security Council, stated that the figure of 40,000 tons was "very conservative." He added that the actual quantity of toxic substances may have been a whole order of magnitude larger. "News Chronology: February-May 1994," *Chemical Weapons Convention Bulletin*, no. 24 (June 1994): 24. The New York Times reported that "some Russian officials have hinted" that more than 40,000 tons was produced. Michael Gordon, "Moscow Is Making Little Progress In Disposal of Chemical Weapons," *New York Times*, 1 December 1993, A1.

²⁴ Interview by author, 23 May 1994. Phase II of the Memorandum of Understanding data exchanges took place in May and June 1994, followed by each side conducting five "practice" challenge inspections at declared government facilities from September to December of 1994. See Thomas W. Lippman, "Administration Voices Concern On Russian Treaty Compliance," *Washington Post*, 11 December 1994, A36; U.S. Arms Control and Disarmament Agency, *Adherence to and Compliance with Arms Control Agreements*, Report to Congress (Washington, D.C.: U.S. Arms Control and Disarmament Agency, 30 May 1995), 13.

U.S. negotiators have also relentlessly sought Russia's cooperation in bringing the BDA into force. Different reasons have been given for the less-than-enthusiastic response that U.S. overtures have received.²⁵ First and foremost among these reasons is the Russian government's reluctance to undertake obligations that it cannot afford. Firm cost estimates for Russia's destruction program are not available, but they start at about one billion dollars.²⁶ For a government struggling with an economic transition that has produced massive dislocation of its citizenry, the priorities between funding a weapons destruction program and housing and feeding its people are obvious.

Various Russian officials and legislators state that the Russian destruction program and ratification of chemical disarmament treaties are unlikely to move forward until Russia is confident that it has the financial means to fulfill its treaty obligations.²⁷ According to Dr. Alexander Pisarev of the Russian Embassy in Washington, D.C.:

The Russian government fully understands that the main burden of destroying its chemical weapons stockpile will lay on Russia's shoulders. At the same time, however, the Russian government expects other signatories to the CWC to help at the outset of this destruction program. This expectation is especially high for the United States, which has promised assistance.²⁸

Pisarev is referring to assistance that U.S. officials, including President Bill Clinton, have indicated would be forthcoming once U.S. experts were confident that the destruction methods proposed by Russia would meet treaty requirements.²⁹

Given the complications that have been encountered over the last few years, Congress has only once approved additional funding—\$30 million—for Russia's chemical weapons destruction

²⁵ For example, when Congressman Glen Browder returned from a trip to Russia where he met with legislators as well as federal and local officials, he cited several reasons for lack of progress. He stated that "there is an apparently small faction that has reservations about the cost of destruction, the coverage of binary weapons by the CWC, the need to retain military utility of the [chemical weapons] stocks, the costs of CWC verification and inspection, and the possibility of non-signatories to the CWC on Russian and [Commonwealth of Independent States] borders." Representative Glen Browder, Memorandum to Representative Ronald V. Dellums, "July 3-10 Codel to Russia Concerning Chemical Weapons," 25 July 1994.

²⁶ These cost estimate vary widely. Arguing for the CWC's ratification before the State Duma, Maj. Gen. Yuri Tarasevich told the representatives that it cost roughly \$3 million a year to store the chemical weapons, but it would cost about \$1.2 billion to destroy the stockpile. Tarasevich is the deputy head of the Radiation, Chemical and Biological Protection Troops. "News Chronology: February-May 1994," *Chemical Weapons Convention Bulletin*, 24. On 1 April 1995, the chairman of the presidential committee, Pavel Syutkin estimated the cost of destroying the Russian arsenal at \$5 to \$6 billion. "New Chronology: February-May 1995," *Chemical Weapons Convention Bulletin*, no. 28 (June 1995), 24. In comparison, destruction of the U.S. stockpile is estimated to cost just under \$12 billion.

²⁷ Catherine Touns, "U.S. Russia Slow to Destroy Chemical Weapons After Vow," *Washington Times*, 31 January 1995.

²⁸ Dr. Alexander Pisarev, interview by author, Washington, D.C., 12 September 1995.

²⁹ At the January 1994 Moscow summit, Clinton pledged to consider additional U.S. assistance for Russia's destruction program. "News Chronology: November 1993-February 1994," *Chemical Weapons Convention Bulletin*, no. 23 (March 1994): 21. Russia plans to use a two-step process, chemical neutralization followed by bitimization. Early results from joint testing of this approach in the United States are promising. Joint tests continue at Saratov. For more detail, see Maj.Gen. Roland Lajoie's (USA, Ret.) essay in this report.

program.³⁰ Another side-effect of the shortfall in funds available for destruction in Russia has been the revision of the BDA's schedules. If the BDA were to be enacted, destruction would begin by 30 June 1997 and end by 30 June 2004.

The second reason cited for lack of progress relates to the Presidential Committee for Convention-Related Chemical and Biological Weapons Matters that Yeltsin created in February 1992 to oversee the destruction program. Because those who build something often have the most knowledge about how to destroy it, Yeltsin appointed veterans of the Soviet chemical weapons complex to this committee. Similarly, the U.S. Army Chemical Corps, which ran America's programs to develop and produce chemical weapons, is now managing the destruction of the U.S. arsenal. In Russia's case, however, some members of Russia's chemical corps and chemical industry are sympathetic to reactionaries who want to revert to Communist practices. Many of these individuals spent a lifetime building the Soviet chemical weapons program, and they perceive proposals to destroy the stockpile as a threat to their jobs and a negation of their careers. Accustomed to the structure and control of the Soviet Union's planned economy, many of these managers are also ill at ease with the uncertainties brought about by Russia's economic and political transition. Therefore, some of the very people that Yeltsin asked to supervise the destruction of the Russian stockpile have stalled progress on that front.

A third reason that little headway has been made is that proposals to destroy the Russian stockpile have run into strong resistance from people living near prospective destruction sites. In 1988, frightened citizens near the USSR's pilot destruction plant at Chapayevsk protested so vehemently that the Soviet government was forced to turn it into a training facility.³¹ Grassroots apprehension that chemical weapons destruction would endanger public health and the environment was not dampened by Yeltsin's promise to improve health care and other services in communities where destruction facilities would be built. Also, many of these people apparently did not know what was being stored in their midst until recently.³² The location of Russia's stockpile storage sites was only made public in January 1994.³³

The commission's initial proposal for the stockpile's destruction, which involved transporting chemical weapons through densely populated areas along "technically and structurally unsafe" rail lines, was heavily criticized.³⁴ The commission itself became suspect. On 8 April

³⁰ In 1994, Congress added another \$30 million for the construction of an analytical laboratory to support this destruction program.

³¹ Igor Khripunov, "The Human Element In Russia's Chemical Weapons Disposal Efforts," *Arms Control Today* 25, no. 6 (July/August 1995): 18.

³² Such was the case with the local leaders at a stockpile storage site visited by Congressman Glen Browder (D-Alabama) in mid-1994. Interview with Glen Browder, Washington, D.C., 14 September 1995.

³³ Igor Vlasov, "Chemical Splinters in Russia's Body," *Rossiiskaya Gazeta*, 15 January 1994, 3.

³⁴ Initial plans set aside 13 percent of the cost of the program's first phase for housing and other infrastructure improvements. For more on this proposal, which was made to the Supreme Soviet in the fall of 1992, see Khripunov, "The Human Element In Russia's Chemical Weapons Disposal Efforts," 18-19.

1994, Yeltsin issued a one-line statement firing its chairman, retired Gen. Anatoly Kuntsevich, for "numerous and gross violations" of his duties.³⁵

Another reason that has thwarted progress is that U.S. officials have had difficulty pinpointing just which organization in the new Russian government has the principal authority for these matters. Among the organizations involved are the Ministry of Defense, the Ministry of the Interior, and the Ministry of Foreign Affairs. At various times U.S. officials found that one organization, then another, appeared to be in charge of the destruction program or a particular facet of it. Well over a year passed before Pavel Syutkin was confirmed as Kuntsevich's replacement as chairman of the presidential committee. This situation appears to have improved with Yeltsin's 24 March 1995 formation of a new interministerial committee that will report to his National Security Advisor, Yuri Baturin, who is to coordinate the activities of the different departments involved.³⁶ Yeltsin's order also firmly stated that Russia's chemical weapons would be destroyed at the seven sites where they are stored.

Moscow's willingness to work with U.S. officials has noticeably increased since the Russian government has succeeded in negotiating agreements granting local governmental approval for work on the destruction program to proceed in three of the seven stockpile communities. Agreements are now in place for Gorny, Kambarka, and Shchuche.³⁷ On 16 September 1995, Yeltsin took another important step in creating the governmental infrastructure to execute this program when he submitted a draft law on the destruction of Russia's chemical weapons to the Duma's Defense Committee.³⁸ Duma passage of this law will remove a major obstacle impeding Russian ratification of the CWC.

A final suggested reason for sluggish progress is that Russia's travails in putting together a coherent destruction program may simply be a cover to hide the novichok binary program. According to this school of thought, hardliners within the Russian government have been holding off the entry into force of the BDA and the CWC to enable the continued production of new chemical weapons and/or to conceal evidence of the novichok program. The veracity of this theory cannot be tested without the on-site inspections enabled by the BDA or the CWC.

A related school of thought submits that stalling allows Russia to convert its chemical weapons production facilities to the manufacture of commercial products without U.S. or international supervision. How to convert former production facilities for peaceful purposes has been a staple of bilateral discussions for the past few years. U.S. policy makers have argued that

³⁵ Richard Boudreaux, "Yeltsin Fires Chemical Warfare Chief," *Los Angeles Times* (8 April 1994). No further specification of the charges against Kuntsevich was provided.

³⁶ "News Chronology: February-May 1995," *Chemical Weapons Convention Bulletin*, no. 28 (June 1995): 23.

³⁷ Khripunov, "The Human Element," 19-20. This summer, local officials near Shchuche signed a legal document granting Moscow authorities permission to start surveying for the exact site for a destruction facility.

³⁸ This legislation contains the comprehensive plan to destroy the stockpile, which is the foundation that must be in place before Russia can ratify the CWC. Presidential Press Service, Moscow, 18 September 1995.

Russia is trying to weaken the terms for destruction or conversion of these facilities.³⁹ Russian officials counter that the costs of all of the possible attendant verification procedures are prohibitive. They also observe that Russia's economy suffers if these facilities, which could be making commercial products, must remain closed until the BDA or the CWC become effective.

One does not have to search too hard to see that the actions of Moscow and Washington on this important security matter remain closely linked. The Duma has held hearings on the CWC. In October 1994, the Duma's Committee on Defense stated that "Chemical disarmament meets in full measure the national interests of Russia."⁴⁰ However, the Duma cannot act on the treaty until Yeltsin formally submits it for consideration. Yeltsin is unlikely to take this step until the funding picture for chemical weapons elimination becomes clearer. On the opposite side of the Atlantic, the Senate held numerous hearings on the CWC in 1994, but has taken no action since. Congress is also reticent to approve additional funds to help Russia's destruction program. Some in Congress argue that Russia must answer all questions about the novichok program before the United States takes additional steps: Russian policy makers counter that the United States should provide the promised assistance before Russia takes additional action. Each side is thus waiting for the other to move first.

The Pursuit of U.S. National Security Interests

When the Senate debates the CWC, some are likely to claim that a decision on the CWC has to be predicated upon the progress or lack thereof that has been achieved through bilateral chemical weapons agreements with Russia. Those who insist on clinging to this approach mistake the appetizers for the entree. The CWC is best suited to help the United States reach its near-term objective to resolve problems in Russia and its long-range objectives regarding nonproliferation policy and chemical weapons disarmament.

Some of the most important decisions pertaining to chemical weapons disarmament in Russia are to be taken in Moscow, but the decisions made by the U.S. Senate can influence what unfolds in Russia. The U.S. Senate's actions can either make it less complicated for Russia to proceed along a constructive path or easier for Russia to go in the wrong direction. The decisions facing the Senate are whether ratification of the CWC and the provision of additional U.S. resources for the destruction of Russia's chemical arsenal would increase the probability that Moscow chooses a desirable course. Ratification of the CWC and the provision of additional U.S. resources for the destruction of Russia's chemical arsenal are strong incentives for Russia to do so.

³⁹ For example, both agreements state that inspectors can "observe all areas, all activities, and all items of equipment at the facility," take samples from "any area," and use "continuous monitoring with on-site instruments and the physical presence of inspectors." See Amy E. Smithson, "Russia Wants Plastics, Too," *Bulletin of the Atomic Scientists* 50, no. 3 (May/June 1994): 14-15. Lack of progress on bilateral issues has spilled over to the CWC's Preparatory Commission, slowing to a crawl decision making about the operational details of the CWC's declarations, inspections, and administration.

⁴⁰ Committee on Defense, Federal Assembly of the Russian Federation, State Duma, "On the Course of Preparation of the Russian Federation for the Process of Destruction of Chemical Weapons and for Ratification of the 'Convention on the Prohibition of Development, Production, Stockpiling and Use of Chemical Weapons and On Their Destruction'," (Moscow, 31 October 1994), 2.

Those still fixated upon the problem and not the solution will argue that the United States should take no action on the CWC until Russia "comes clean" about the novichok program under the Memorandum of Understanding. This argument is self-defeating, because U.S. decision makers will not truly know whether Russia has been totally forthcoming in declaring its activities until inspections are conducted. Suspicions require on-site inspections. Russia can only be held accountable under a legally binding agreement. The Memorandum of Understanding is not such an agreement; the CWC is.

Some will also contend that the BDA must be activated before the CWC is ratified and enters into force. Actually, Russia accrues several advantages in enacting the BDA first. According to the March 1993 draft Protocol of the BDA, the *inspecting* party agrees to "bear the expenses related to inspection activities..., including the installation and maintenance of agreed equipment."⁴¹ Thus, the financial burden on the Russian government would be less under the BDA since under the CWC Russia will be assessed a constant share of the budget for the Technical Secretariat.⁴² While the United States is more accustomed to working bilaterally with Russia on sensitive military issues, there is no reason other than Russia's financial plight why the BDA must precede the CWC, especially since the verification provisions under the two accords are virtually identical.

The largest risk that the U.S. Senate runs in ratifying the CWC before Russia is that Russia will not quickly follow suit. Even so, the United States would occupy the high ground of having helped to reinforce an international norm against chemical weapons development, production, and stockpiling—the very activities that the United States long ago ceased unilaterally. Until the U.S. Senate gives its consent to ratification of the CWC, it will be in the untenable position of complaining about possible activities in Russia that may violate a law that does not exist.

No matter how detailed a map Mirzayanov and other whistleblowers provide to the novichok program, without the CWC that map will be of little avail. Until the CWC is in force, inspectors will be denied the opportunity to take the measure of what agents may or may not have been developed. Given the information already available about the novichok program, those within Russia's chemical weapons complex will be hard-pressed to foil the CWC's routine and challenge inspections as long as the international Technical Secretariat is doing its job properly. If an effort is made to take the binary program underground, so to speak, trying to hide it amidst the background noise of commercial chemical industry, Russia would be subject to findings that it has violated the CWC's prohibition on the use of any toxic chemicals for military purposes. Unless the CWC is in force, Russia's commercial activities with dual-use chemicals will remain undeclared and unmonitored.

⁴¹ Emphasis added. Protocol on Implementation Measures Relating to the Agreement Between the United States of America and the Union of Soviet Socialist Republics on the Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Convention on Banning Chemical Weapons, 26 March 1993 Joint Draft Text, I(D)3(c).

⁴² Russia's assessment for Preparatory Commission activities is 5.67 percent, slightly smaller than Russia's 5.68 percent assessment for United Nations activities. Preparatory Commission Document PC/VII/A/4 (The Hague: OPCW Preparatory Commission, 23 September 1994), 4, 8.

Moreover, refusal of a challenge inspection would automatically put Russia in violation of the CWC. Inspectors will have two basic strategies to assess whether Soviet authorities produced novel chemical agents that are not banned by the CWC.⁴³ First, all chemical agents are made from the same chemical building blocks—sulfur, phosphorus, or flourine. Inspectors can analyze samples they have taken for the chemical agent precursors that the CWC controls, as well as the chemical by-products that result when a chemical solution degrades over time. This analysis will give inspectors insight into whether new agents were produced. Second, the inspectors will look for evidence of novel chemistry, which would require the modification of standardized equipment. While interviewing workers and reviewing facility records, they will also look for anomalies, which will be reported if Russian officials have no satisfactory explanation.

Even though inspectors have been able to confirm the presence of chemical weapons years after their use occurred,⁴⁴ pragmatists will not expect the inspection process to produce immediate, clear-cut answers. Nonetheless, the United States stands to learn a great deal more about the novichok program from the CWC's inspections than it would otherwise glean through national technical means.

Similarly, the best route to watch over Russia's conversion of former chemical weapons production facilities is through the CWC. Before long, however, this particular issue may be moot. Earlier this year, a senior Russian official announced that "Russia has proceeded to destroy" over half of its chemical weapons production facilities to further the "definitive elimination of the military chemical threat" and demonstrate Russia's commitment to the CWC.⁴⁵ The longer the U.S. Senate delays ratification of the CWC, the more former Russian production facilities will be converted without international supervision. In contrast, with the CWC the opportunity arises to monitor this conversion process closely, confirming the elimination of specialized equipment and structures.

Proper implementation of the CWC would also bolster accountability for Russia's chemical weapons stockpile. International inspectors have the right to inventory, secure, and routinely check Russia's arsenal until it is destroyed. In this manner, the CWC's monitoring process can help prevent Russian chemical weapons from finding their way into the hands of proliferators or terrorists.

As for further assistance to Russia's chemical weapons destruction program, some will argue that taxpayers dollars should not be used to help fulfill Russia's treaty obligations. However, tightening security around Russia's chemical weapons stockpile and hastening its

⁴³ Note that the CWC's list of prohibited agents, as well as the control lists of dual-use chemicals, can be modified.

⁴⁴ Soil samples taken from four year-old bomb craters in Iraq had traces of the nerve gas sarin and the blister agent mustard, confirming Iraq's violation of the 1925 Geneva Protocol ban on the use of chemical weapons. See "Scientific First: Soil Samples Taken from Bomb Craters in Northern Iraq Reveal Nerve Gas -- Even Four Years Later," Physicians for Human Rights/Human Rights Watch (Boston, 29 April 1993); *Report on Analysis of Samples Collected in Northern Iraq* (Porton Down, United Kingdom: Chemical & Biological Defence Establishment, Ministry of Defence, March 1993).

⁴⁵ "Statement by the Head of the Delegation of the Russian Federation at the Eleventh Session of the Preparatory Commission for the Organisation for the Prohibition of Chemical Weapons," Document PC-XI/11 (The Hague: Preparatory Commission for the Organisation for the Prohibition of Chemical Weapons, 25 July 1995).

destruction will measurably reduce the possibility that Russian chemical weapons will one day harm Americans.⁴⁶ As one person who had been to Russian chemical weapons storage facilities concluded, "The best security is to get rid of it."⁴⁷ Any additional funding would probably fall under the umbrella of the Nunn-Lugar Cooperative Threat Reduction Program, which was initiated in the aftermath of the Soviet Union's disintegration to help secure and dismantle the former Soviet Union's weapons of mass destruction. Congress might also recall that whatever assistance the United States provides would simultaneously benefit the U.S. companies awarded the contracts for this work.⁴⁸

The United States cannot be expected to pay for most of these expenses, and that does not appear to be what Russian officials are requesting. Russia has asked for assistance in getting its destruction program *started*. Through incremental funding, Congress can significantly facilitate this process. Western technical credibility as well as money are important here. Wary of a chemical Chernobyl, Russian citizens will have more confidence that chemical weapons destruction can be accomplished safely with Western technical assistance and oversight. Local communities are more likely to cooperate with Moscow if the United States stays involved in Russia's chemical weapons destruction program.⁴⁹ Already, other countries, recognizing Russia's severely depressed economy and the threat resident in Russia's chemical weapons stockpile, have begun offering financial and technical assistance. Germany, for example, is helping to develop technology to destroy the mustard and lewisite agents at the Gorny storage site. Sweden has pledged assistance, and internal discussions are taking place in other European capitols about how they might help the Russian destruction program.⁵⁰ Thus, the United States would have partners in this effort.

In sum, the Senate will have little effect on the problems associated with Russia's chemical weapons complex by sitting on the sidelines. Ratification of the CWC and increasing U.S. assistance for the destruction of Russia's chemical arsenal are sensible steps to begin resolving these problems.

⁴⁶ According to Browder, "Destruction of these weapons will be a very worthwhile investment in improving U.S., Russian, and international security." Browder, "July 3-10 Codel to Russia Concerning Chemical Weapons," 25 July 1994.

⁴⁷ Interview by author, 28 July 1995.

⁴⁸ For a similar argument, see Secretary of Defense William Perry's win-win-win concept, as quoted in Dunbar Lockwood, "The Nunn-Lugar Program: No Time To Pull the Plug," *Arms Control Today* 25, no. 5 (June 1995): 10. These funds should not, however, be used to construct hospitals, roads, or make other improvements that Moscow has promised local communities for their cooperation with the destruction program.

⁴⁹ Congressman Browder discussed this matter with Russian officials in 1994. In his trip report, he states "It was also apparent in frank discussions with local and regional civilian officials that active American-Russian partnership in [chemical weapons] destruction will help move the program along among local site populations." Browder, "July 3-10 Codel to Russia Concerning Chemical Weapons," 4.

⁵⁰ Interview by author, 15 September 1995. Sweden has pledged 2.6 million Krona (approximately \$370,000) to assist destruction at the Kambarka site. "News Chronology: November 1994-February 1995," *Chemical Weapons Convention Bulletin*, no. 27 (March 1995), 28-29.

Furthermore, the CWC will promote the long-term U.S. nonproliferation objectives by helping to reverse the tide of chemical weapons proliferation. Undoubtedly, the time has come for the U.S. Senate to act.

Appendix: Chronology of Events Related to U.S. and Soviet/Russian Chemical Weapons Disarmament

Laurie H. Boulden

- 1960 Negotiations for an international chemical weapons ban begin in Geneva.
- 1969 The United States ceases production of unitary chemical weapons.
- 1979 The U.S. Army constructs a new chemical agent disposal facility at the Tooele Army Depot, Utah, to test high-temperature incineration as well as neutralization. From 1979 to 1987, the Army incinerates over 83 metric tons of chemical agents and nearly 38,000 munitions.
- 9 March 1982 After encountering difficulties with neutralization, the U.S. Army selects the incineration method to destroy the stockpile.
- 18 April 1984 At the Conference on Disarmament (CD) in Geneva, Vice President George Bush presents a draft text of the Chemical Weapons Convention (CWC) banning the development, acquisition, production, stockpiling, transfer, and use of chemical weapons. His proposal calls for any time, any place challenge inspections of facilities suspected of engaging in banned activities. The Soviet Union quickly dismisses the U.S. proposal.
- 1984 The U.S. National Research Council (NRC) Committee on Demilitarizing Chemical Munitions and Agents reviews a range of U.S. chemical weapons disposal techniques and endorses the Army's selection of incineration, the so-called "baseline" approach.
- 1985 The Soviet government selects Chapayevsk as the site for a chemical weapons destruction facility.
- November 1985 U.S. Public Law 99-145 directs the Department of Defense to destroy over 95 percent of the total U.S. stockpile of chemical agents and munitions by 30 September 1994. The Army estimates the total cost for destruction will be \$1.7 billion. This figure rises to \$8.6 billion in 1993.
- 1986-1989 The Soviet government operates Chapayevsk as a demonstration facility using the KUASI 2-step destruction technology, which neutralizes the chemical agent with an organic reagent and then incinerates the resulting mass.

- 10 April 1987 In Prague, Soviet Premier Mikhail Gorbachev announces that the Soviet Union has stopped producing chemical weapons and has never deployed any outside of its own territory.
- 6 August 1987 At the CD, the Soviet Union accepts the principle of challenge inspections without the right of refusal, resolving a major impasse in CWC negotiations.
- 4 October 1987 Western observers from 45 countries visit the Soviet chemical weapons testing facility at Shikhany. They examine the facility and the chemical weapons to be destroyed.
- 23 February 1988 The Under Secretary of the U.S. Army announces that chemical weapons will be incinerated at the eight sites where they are stored. This alternative was selected over transportation options because a more credible emergency response program could be established at the storage sites rather than along transportation corridors that would be used to relocate the weapons to one or two central destruction facilities.
- 28 July 1988 At the CD, the United States voluntarily reveals the location of its chemical weapons storage facilities and its plans to eliminate the U.S. chemical weapons arsenal. The U.S. delegation calls on the Soviet Union to do the same.
- 23 September 1989 The Soviet Union and the United States sign the Wyoming Memorandum of Understanding (MOU) to build confidence that a chemical disarmament treaty can be successfully implemented. The MOU consists of two phases of data exchanges and trial on-site inspections.
- 5 September 1989 Due to public protests about safety at the Chapayevsk destruction facility, Soviet Government Decision #1565 turns Chapayevsk into a training facility.
- 29 December 1989 Phase I of the Wyoming MOU data exchange takes place. The United States and the Soviet Union swap data on aggregate stockpile size; types of agents; the percent of chemical agents in munitions, devices, or bulk storage; the location of storage, production, and destruction facilities; and types of agents and munitions at each. The Soviet Union declares the size of its chemical stockpile to be 40,000 metric tons.
- 7 February 1990 U.S. Secretary of State James Baker and Soviet Foreign Minister Edward Shevardnadze agree on a framework document to help accelerate CWC negotiations at the Conference on Disarmament. This document outlines plans for a bilateral destruction agreement.
- 1 June 1990 The United States and the Soviet Union sign the "Agreement on Destruction and Non-Production of Chemical Weapons and on Measures to Facilitate the Multilateral Chemical Weapons Convention," known as the Bilateral Destruction Agreement (BDA). In this accord, both sides pledge to cease chemical weapons production, to reduce existing stocks to 5,000 metric tons

- by the end of 2002, to cooperate on safe technologies for destruction, and to allow on-site inspections during the destruction process. Complications caused by the collapse of the Soviet Union later spur a renegotiation of the BDA's timelines, with destruction slated to begin in 1997 and end by 2004.
- 30 June 1990 The U.S. Army begins testing its pilot destruction facility at Johnston Atoll in the Pacific. These tests involve M-55 rockets and 105mm M-60 projectiles filled with chemical agents.
- February 1991 Phase I of the Wyoming MOU comes to a close. The Soviet Union and the United States successfully conducted reciprocal trial inspections at two production, three storage, and two industrial chemical facilities.
- 13 May 1991 President George Bush announces a U.S. initiative to propel the CWC negotiations toward conclusion. The United States commits unconditionally to destroy all of the U.S. stockpile within 10 years of the CWC's entry into force. The United States also renounces *any* use of chemical weapons, including use in retaliation for a chemical attack, once the CWC becomes effective and providing the USSR is a participant in the treaty.
- 10 October 1991 Dr. Vil Mirzayanov, a scientist at the Soviet State Institute for Organic Chemistry and Technology (GosNIIOKhT), the Soviet Union's premier chemical weapons research facility, publishes an article in the newspaper *Kuranty*. He charges that the Soviet Union has continued to develop, test, and produce chemical weapons.
- 19 August 1991 A *coup d'etat* almost topples the Soviet government.
- 25 December 1991 Gorbachev announces the imminent termination of the Soviet government. As the new year dawns, the flag of the Federation of Russia is raised over the Kremlin.
- 6 January 1992 Mirzayanov is fired from his job at GosNIIOKhT because of his revelations about the "novichok" program to develop a new generation of binary chemical weapons.
- 19 February 1992 Russian President Boris Yeltsin's Presidential Decree #160 creates the "Presidential Committee for Convention-Related Chemical and Biological Weapons Matters" to oversee Russian treaty compliance, including the chemical weapons destruction program.
- 30 July 1992 The United States and Russia sign an agreement concerning the safe, secure, and ecologically sound destruction of chemical weapons. This agreement initiates such activities as joint training in chemical weapons destruction methods and other efforts designed to facilitate Russia's destruction program. The United States pledges \$25 million in technical assistance.

- 10 August 1992 After more than three decades, CWC negotiations come to a successful conclusion at the CD in Geneva.
- 16 September 1992 With Lev Fyodorov, Mirzayanov publishes an article about the novichok binary program in *Moscow News*. Mirzayanov conducts interviews with western journalists, which result in international press coverage of this story.
- October 1992 The Presidential Committee submits a draft proposal to the Duma for the phased destruction of the Russian stockpile, based on an earlier Yeltsin decree supporting a phased approach. Phase I calls for the on-site destruction of blister agents at Kambarka and Gorny. In Phase II, nerve agent-filled munitions from Kizner and Shchuche are to be transported for destruction to a facility in Novocheboksarsk, Chuvash Republic.
- 2 October 1992 Tartarstan declares itself a weapons of mass destruction (WMD)-free zone, outlawing any production, storage, or movement of WMD on its territory. This action makes it impossible to execute the Presidential Committee's plan to transport chemical weapons from Kizner and Shchuche to Novocheboksarsk for destruction.
- 22 October 1992 Russian authorities arrest Mirzayanov and place him in Lefortovo Prison in Moscow. He is charged with revealing state secrets, but claims his arrest violates the Russian constitution.
- 1 November 1992 Mirzayanov is released from prison and awaits trial.
- 25 December 1992 The Chuvash Supreme Soviet forbids chemical weapons destruction within its borders, thus outlawing the destruction facility planned for Novocheboksarsk.
- 13-15 January 1993 In Paris, Russia and the United States join 130 other countries in becoming initial signatories to the CWC.
- 19 January 1993 The Duma rejects the Presidential Committee's draft destruction program, citing strong regional opposition to the transportation of chemical weapons from storage facilities to destruction sites.
- March 1993 The Duma asks the government and the Presidential Committee for a more detailed plan for destruction.
- 26 March 1993 In Moscow, negotiations to conduct Phase II of the Wyoming MOU conclude successfully.
- June 1993 The United States establishes the Chemical Weapons Destruction Support Office in Moscow to facilitate U.S. assistance to the Russian destruction program.

- 10 August 1993 A new commission, headed by First Vice Premier Oleg Soskovets, is created to recommend destruction sites to Yeltsin and to work to secure the local community's approval of a facility.
- 11 August 1993 The U.S. Army opens the \$385 million Tooele baseline destruction facility at Tooele, Utah, and begins to test its equipment in preparation for trial burns to prove that the incinerators can meet pollution control standards.
- September 1993-
March 1994 Russian scientists visit the United States for March 1994 training at U.S. chemical weapons sites, mostly at the training facility in Aberdeen, Maryland. They also work with U.S. citizens' groups to learn about the legal, political, and public aspects of running a destruction program.
- 22 October 1993 In an interview with *Krasnaya Zvezda*, former chairman of the Presidential Committee, Anatoly Kuntsevich, states that no agencies or ministries of the Russian government have complete information on the amount or location of previously disposed chemical weapons-related materials.
- 3 November 1993 Kambarka's city and regional councils approve the placement of a chemical weapons destruction site there, in exchange for Moscow's pledge of 6 billion rubles for infrastructure projects, including better water and gas supplies and a sewage treatment facility.
- 23 November 1993 President William Clinton submits the CWC to the Senate for its advice and consent to ratification.
- 14 January 1994 At a summit in Moscow, President Bill Clinton promises to consider additional measures to assist Russia's chemical weapons destruction program. Clinton and Yeltsin sign a document initiating Phase II of the Wyoming MOU.
- 15 January 1994 *Rossiiskaya Gazeta* reveals the location of the seven sites in Russia where chemical weapons are stored. This information was previously classified.
- 27 January 1994 Mirzayanov is arrested again, only to be released from prison 26 days later.
- 4 February 1994 The NRC Stockpile Committee issues recommendations on U.S. chemical demilitarization. The NRC concludes that the Army's incineration method has been demonstrated to be a safe and effective disposal process. Although supporting continued research on alternate techniques, the NRC states that the benefits of developing another successful technique are outweighed by the risks associated with the many years of storage needed to develop alternate techniques fully.
- March 1994 Congress adds \$30 million for the construction of a laboratory to support Russia's destruction program.

- 11 March 1994 The Russian government drops its legal case against Mirzayanov due to lack of evidence.
- 17 March 1994 According to the London *Daily Telegraph*, Valery Menshikov, a consultant for the Russian Security Council, asserts that Russia secretly destroyed an unknown quantity of chemical weapons in 1993 without international monitoring. This destruction activity, he explains, was intended to reduce the Russian stockpile to the declared level of 40,000 metric tons.
- 24 March 94 The head of the Foreign Ministry's arms control department, Oleg Sokolov, states that Russia's interests require it to become one of the first 65 signatories to ratify the CWC, and that the "negative implications from Russia's failure to do so are obvious."
- 7 April 1994 Chairman of the Presidential Committee Anatoly Kuntsevich is fired by Yeltsin for "numerous and gross" violations of his duties.
- May 1994 Under the aegis of the U.S. technical assistance program, the Department of Defense awards a contract to Bechtel National, Inc. to prepare a comprehensive implementation plan for Russian chemical weapons destruction.
- May-June 1994 Russia and the United States exchange data under Phase II of the Memorandum of Understanding.
- 8 June 1994 The People's Court of Moscow awards Mirzayanov 30 million rubles in compensation for his arrests and trial. To date, he has not received any compensation.
- 16 September 1994 *Obshchaya Gazeta* prints details about Russian chemical weapons destruction plans, including a Defense Ministry concept paper. Russian experts were most angered by their government's seeming disregard for public opinion in making decisions about chemical demilitarization.
- 31 October 1994 The Russian Duma Committee on Defense states that "Chemical disarmament meets in full measure the national interests of Russia."
- 18 November 1994 The United States and Russia sign the "Addendum to the 1994 Plan of Work for Assistance to the Russian Program for the Destruction of Chemical Weapons within the Framework of the Bilateral Agreement of 30 July 1992," which provides for the joint evaluation of Russian destruction technologies and plans.
- 22 November 1994 A Russian team arrives in the United States to inspect Newport Army Ammunition Depot in Indiana. This trial inspection is one of five that Russian officials conduct at declared U.S. government chemical weapons facilities in Phase II of the Wyoming MOU. During this general time period, U.S. inspectors also inspect five sites in Russia.

- 5 December 1994 At a news conference sponsored by Greenpeace in Moscow, Lev Fyodorov, Chairman of the Russian Union for Chemical Security, states that 4.5 million chemical weapons have been dumped in the seas surrounding Russia since World War II. The chairman of the Saratov Union for Chemical Safety, Vladimir Petrenko, announces that Russian officials engaged in the "unauthorized destruction" of chemical weapons at Shikhany in 1993.
- 7 December 1994 A new Yeltsin order supersedes one from September 1992 about controls on the export of dual-use chemicals, technology, and equipment. Export controls in the new order are more stringent.
- 8 December 1994 GosNIIOKhT countersues Mirzayanov for 33 million rubles.
- 10 December 1994 Phase II of the Wyoming MOU comes to a close with the completion of the final reciprocal trial inspections.
- 14 December 1994 The Chechen Parliament accuses the Russian government of using chemical weapons against them in the military conflict in Chechnya.
- 30 December 1994 Russian Government Decision #1470 provides 36 billion rubles (approximately \$9 million) to Gorny for infrastructure improvements, in exchange for local cooperation with the destruction facility to be built there.
- 6 January 1995 Russian Duma Deputy Ayvars Lezdinsh tells reporters that Federal troops used chemical bombs to contaminate the Chechen reservoir at Grozny during the conflict in Chechnya.
- 21 January 1995 Sweden pledges 2.6 million Krona (approximately \$370,000) in financial aid to Russia to assist with chemical weapons destruction at Kambarka.
- 4 February 1995 The Union for Chemical Safety reports that one-half of the 3,000 workers employed at the chemical weapons production factory in Novocheboksarsk have been or are ill.
- February 1995 The Russian destruction plan is reshaped. Nerve agent-filled munitions now will be destroyed in Phase I.
- 22 March 1995 Upon the authority of Russian Prime Minister Viktor Chernomyrdin, Russian Government Decision #289 announces the "organization of work" for the destruction of lewisite at Kambarka, authorizing the Ministry of Defense to coordinate the project.
- 24 March 1995 Yeltsin issues Presidential Decree #314 "On Preparing the Russian Federation for the Implementation of International Commitments in the Field of Chemical Disarmament" to accelerate and organize Russia's demilitarization efforts. This decree creates an interagency commission to oversee chemical weapons destruction, chaired by National Security Adviser Yuri Baturin, and delineates a list of tasks for all relevant agencies involved in destruction.

- Yeltsin also issues a decree giving Pavel Syutkin, the new chairman of the Presidential Committee, 60 days to plan measures to accelerate preparations for chemical weapons destruction.
- 11 April 1995 Chairman of the Duma Defense Committee Alexander Piskunov states that the Russian Federation will not be among the first 65 states to ratify the CWC because of economic pressures and the upcoming parliamentary elections.
- July 1995 The Russian government and the Shchuche local government sign a protocol authorizing the location of a pilot chemical weapons destruction facility in Shchuche.
- 5 September 1995 In an official statement, Clinton welcomed the adoption of a Senate amendment, sponsored by Senator Carl Levin (D-MI), which expresses the Senate's desire to ratify the CWC quickly.
- 16 September 1995 Yeltsin submits draft legislation to the Duma containing the revised comprehensive plan to destroy the stockpile.

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About the Project

The Chemical Weapons Convention (CWC) is a multilateral treaty of unprecedented scope and complexity that will prohibit the development, production, acquisition, stockpiling, retention, and use of chemical weapons. In conjunction with the CWC's signing ceremonies in January 1993, the Stimson Center launched a project to monitor domestic and international preparations for implementing the treaty and to serve as an information clearinghouse.

The project publishes a periodic newsletter—The CWC Chronicle—to keep officials in government, industry, the diplomatic community, and interested observers abreast of important developments related to the CWC's implementation.

The project assembled a group of experts from the International Atomic Energy Agency (IAEA), which is the oft-cited model for the CWC's new international monitoring agency, to consider what steps they would take and which ones they would avoid if they were building a monitoring agency from scratch. Their warnings and recommendations were published in an occasional paper, "*Administering the Chemical Weapons Convention: Lessons from the IAEA*" (April 1993).

A guidebook, titled "*The Chemical Weapons Convention Handbook*," (September 1993) walks readers through the basic components of the treaty using a thorough, reader-friendly question and answer format. The handbook also provides discussion of such topics as the verification regime and stockpile destruction, as well as a selected bibliography.

Given the CWC's significant reporting and inspection requirements for commercial chemical industry, the project gathered a group of industry experts to solicit their thoughts about these requirements. Their views about the treaty and recommendations to facilitate the effective implementation of the CWC are contained in "*Implementing the Chemical Weapons Convention: Counsel from Industry*" (January 1994).

A report entitled "*The U.S. Chemical Weapons Destruction Program: Views, Analysis, and Recommendations*" (October 1994) provides an overview of the controversies associated with the Army's stockpile incineration program, which is slated to operate in eight different U.S. sites where the weapons are stored. The report also turns a critical eye to the charges made by opponents to the Army's program, finding the science behind some of these allegations to be poor and lacking in discipline. Consequently, the report recommends that the Army's program be assessed on its own merits, not on the negative stereotype of incineration, and that opposition charges be viewed skeptically. Other recommendations are aimed at facilitating citizen participation in the decision making process and improving oversight of the Army's program.

The Carnegie Corporation of New York funds this project, which is directed by Amy E. Smithson.

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Maj. Gen. Roland Lajoie, U.S. Army (Ret.) is currently Deputy Assistant to the Secretary of Defense for Cooperative Threat Reduction (CTR). He is responsible for implementation of the Nunn-Lugar effort initiated in 1991. Lajoie's 35-year military career culminated in his assignment as the Associate Deputy Director for Operations/Military Affairs at the Central Intelligence Agency. His previous assignments included Army Attache to the USSR; Chief of the U.S. Military Liaison Mission in Berlin; first Director of the On-Site Inspection Agency; and Deputy Director for International Negotiations of the Joint Chiefs of Staff.

Dr. Vil S. Mirzayanov was a scientist for 26 years at the State Research Institute of Organic Chemistry and Technology in Moscow, rising to become the head of the Department of Counteraction to Foreign and Technical Investigations. Dr. Mirzayanov has published over 160 research publications and articles. In addition, he has authored or co-authored 15 patents. Dr. Mirzayanov is a graduate of the Lomonosov Institute of Fine Chemical Technology (Moscow), the Research Institute of Petrochemical Synthesis of the Russian Academy of Sciences (Moscow), and the State Research Institute of Organic Chemistry and Technology.

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