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Preventing Proliferation of Biological Weapons: U.S. Assistance to the Former Soviet States

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Summary

The former Soviet and subsequently Russian biological weapons program possessed capabilities far in excess of any such program known to have existed elsewhere. These capabilities included genetically-altered, antibiotic-resistant pathogens and sophisticated delivery systems. Approximately fifty biological research and production centers (BRPCs) throughout the former Soviet Union devoted either all or part of their work to the program. In the post-Soviet era, former Soviet states drastically reduced and in some cases eliminated funding for these BRPCs. Thousands of BW scientists became unemployed or underemployed, and the facilities, weapons technology, and thousands of strains of pathogens at these BRPCs became vulnerable to theft, sale or misuse.

In the mid-1990s, the United States began engaging BRPCs throughout the former Soviet Union in four kinds of cooperative projects aimed at preventing proliferation of BW capabilities. Collaborative research projects involve former BW scientists in projects with American scientists and seek to deter former BW scientists from selling their expertise to terrorist groups or proliferating states. Several U.S. government agencies are involved in collaborative research projects, most of which are funded through the international science centers. Biosafety enhancement projects are intended to make BRPCs safe places for collaborating scientists to work. In combination, collaborative research and biosafety enhancement projects give U.S. officials routine access to laboratories and facilities that were once used for BW research and production. BioSecurity projects consolidate and restrict access to pathogens. Dismantlement projects target excess infrastructure and BW equipment at BRPC sites for permanent dismantlement. Biosafety, BioSecurity, and Dismantlement projects are funded through and carried out by DOD's Cooperative Threat Reduction Program.

U.S. participants in these projects identify several lessons learned in the past few years. First, it has become clear that the infrastructure of the Soviet/Russian BW complex was more extensive than most analysts realized when the United States initiated its efforts to prevent proliferation of BW capabilities from former Soviet states. Cooperative projects at some BRPCs have helped open doors to other BRPCs, and since 1995, more than forty BRPCs have been involved in cooperative projects with the United States. Second, U.S. participants report that biosafety, biosecurity, and dismantlement projects require complex negotiations, complex engineering work, considerable project management support, and innovative solutions for problems specific to each BRPC. Consequently, they have learned that the United States may need to offer a long-term commitment if it wants to complete the effort. At the same time, the U.S. agencies with BW nonproliferation programs recognize the need to maximize the nonproliferation benefits of U.S. assistance in an environment with limited resources. Finally, U.S. participants have discovered that interpersonal and institutional relationships resulting from these cooperative efforts may play a powerful role in preventing proliferation of BW capabilities from former Soviet states.

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Introduction

The events of September and October 2001 undermined long-held assumptions about U.S. vulnerability and the threat of attack with weapons of mass destruction.[1] The attacks on the World Trade Center and Pentagon led many to believe that neither respect for human life nor the will to self-preservation would stop some people from attacking the United States. Then a few letters laced with anthrax caused death, terror, and disruption and exposed the United States' vulnerability to biological attack. Speaking about these events, former Senator Sam Nunn stated, "We lost our sense of invulnerability but as the world is learning, we also lost our sense of complacency."[2]

The United States has been concerned about the potential for proliferation of deadly weapons or materials from the former Soviet Union for more than a decade. These concerns grew in the latter half of 2001. The 107th Congress held several hearings specifically to examine biological weapons programs and the possibility that they might be used against the United States.[3] Testimony often centered on the legacy of the Soviet and subsequent Russian biological weapons (BW) program. The size and scope of that program reportedly dwarfed any BW program known to have existed elsewhere.

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[1]Most analysts consider nuclear, chemical, and biological weapons to be "weapons of mass destruction (WMD)." Some argue that biological weapons are not weapons of mass destruction, but weapons of mass casualties. Others point out that some biological weapons can destroy agricultural and environmental targets on a massive scale.

[2] "What changed September 11 was not our vulnerability to terrorism but our understanding of it. The greatest shock was perhaps not even the sheer loss of life, which was staggering, but the evil, hate and fanaticism behind it. To most Americans, the attack was unthinkable. Now our nation knows better. The terrorists' capacity for killing is limited only by the power of their weapons." Sam Nunn, Co-Chairman. Nuclear Threat Initiative. "Toward a New Security Framework." Woodrow Wilson Center, October 3, 2001.

[3] Relevant hearings were held in several committees, including the House International Relations Committee, the House Government Reform Committee, the Senate Governmental Affairs Committee— Subcommittee on International Security, Proliferation And Federal Services, and the Senate Committee On Appropriations—Subcommittee On Labor, HHS, Education and Related Agencies.

This report describes the research, development, and production capabilities in the government-sponsored biological weapons complex in the former Soviet Union. It provides an overview of U.S. efforts to prevent proliferation from this complex to other states and sub-state actors. It focuses only on the BW program that was initiated by the Soviet state and sustained by the Russian state. It does not address biological weapons capabilities that may exist in former Soviet states outside the state-sponsored biological weapons complex. Furthermore, the report draws only on unclassified sources, so it may not present a complete picture of BW capabilities in former Soviet states or U.S. efforts to prevent their proliferation.

The Soviet/Russian Biological Weapons Program

Background[4]

Reports indicate that Soviet development of biological weapons (BW) dates back to at least 1928 when the Red Army ordered Soviet scientists to find a way to deploy typhus as a weapon. The Soviet BW program expanded in the 1930s; there are strong indications that weapons testing involved some prisoners in Stalin's labor camps. As the program further expanded after the war, the primary known site for BW testing became Vozrozhdeniye Island, which is located in the Aral Sea near Kazakhstan and Uzbekistan.

Negotiations on the 1972 Biological Weapons Convention (BWC) alerted Soviet authorities to Western achievements in weaponizing pathogens.[5] Soviet authorities reportedly doubted that other signatories would abandon their development of biological weapons. At the same time, a prominent Soviet molecular biologist convinced the Soviet leader, Leonid Brezhnev, and other Soviet authorities that developing genetically altered pathogens and more advanced ways to weaponize them would give the Soviet Union a strategic advantage in the Cold War.

In 1973, the Soviet Union created Biopreparat to pursue this new direction in BW development. It was a network of approximately forty "private" biological research and production centers (BRPCs), and reportedly its work remained hidden even from many high-ranking Soviet officials. At its peak, Biopreparat and four military biological institutes reportedly employed approximately 60,000 people.

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[4]For background on the Soviet/Russian Biological Weapons Program see Alibek, Ken, with S. Handelman. *Biohazard: The Chilling True Story of the Largest Covert Biological Weapons Program in the World–Told from the Inside by the Man Who Ran It.* New York: Random House, 1998; Mangold, Tom and Jeff Goldberg. *Plague Wars: The Terrifying Reality of Biological Warfare.* New York: St. Martin's Griffin, 1999; and Miller, Judith, Stephen Engleberg, and William Broad. *Germs: Biological Weapons and America's Secret War*. New York: Simon & Schuster, 2000.

[5] For details on the substance of the BWC see *Proliferation Control Regimes: Background and Status*. CRS Report 97-343 F, by Robert D. Shuey, Steve R. Bowman, and Zachary S. Davis.

Approximately 9,000 of those were scientists with knowledge that could contribute to the development and production of biological weapons.[6]

Soviet BW Capabilities

According to unclassified reports, the Soviet/Russian BW program developed and produced genetically altered pathogens designed to attack human targets, agricultural targets, and environmental targets. The BWC classifies BW agents as bacteria, toxins, viruses, or rickettsaie. The Soviet/Russian program experimented with all these. The program developed and "weaponized" genetically-altered bacteriological agents such as anthrax, plague, tularemia, glanders, and brucellosis that were resistant to heat, cold, and antibiotics.[7] They also "weaponized" several viruses, including:

- Smallpox, which can kill 30-40% of an exposed population during an epidemic;[8]
- Venezuelan Equine Encephalitus, which is unlikely to kill but can incapacitate troops;
- The Marburg virus, which, like the Ebola virus, is a haemorrhagic fever which destroys cells and causes massive internal bleeding.[9]

According to some sources, the Soviet/Russian program also developed "chimera" or "recombinant" weapons, such as a combination of plague bacteria and the myelin toxin which attacks sheaths protecting nerve fibers.[10] Reports indicate that the Soviet/Russian BW program also developed weapons to attack plants and animals. The anti-plant diseases targeted corn, wheat, potatoes, tobacco, barley and other crops.[11] The anti-animal diseases included Foot-and-Mouth Disease and African swine fever.

Reports indicate that the Soviet BW program maintained the capacity to produce and store millions of liters of pathogens. For example, the BW production facility at Berdsk reportedly housed 40 fermenters that could hold 2,560,000 liters of a

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[6] Smithson, Amy. *Toxic Archipelago: Preventing Proliferation from the Former Soviet Chemical and Biological Weapons Complexes.* Washington, DC: The Henry L. Stimson Center, 1999, p. 10.

[7] Mangold and Goldberg, *Plague Wars*, p. 93.

[8] *Ibid*, p. 385

[9] According to Ken Alibek, one of the Russian weapons scientists died while trying to convert the Marburg virus to a weapon. The Soviets later weaponized the strain of the virus harvested from that scientist's body. See Alibek and Handelman. *Biohazard*, pp. 123-132, 137, 170.

[10] *Ibid*, pp. 154-155, 163-164,166-167

[11] Ban, Jonathan. "Agricultural Biological Warfare: An Overview." The Chemical and Biological Arms Control Institute. June, 2000.

"weaponizable" pathogen.[12] The Stepnogorsk facility in Kazakhstan had ten twenty-ton fermenters. These could produce approximately 300 tons of anthrax spores in 220 days, reportedly enough to infect the entire population of the United States if effectively dispersed.[13]

The Soviet/Russian BW complex reportedly also succeeded in refining agents to improve the delivery capacity of biological weapons. One ancient way to deliver biological weapons is through the use of infected "vectors," such as bugs, rodents, or cadavers.[14] The Soviet/Russian BW program reportedly developed an infrastructure that could quickly cultivate millions of parasitic insects to carry disease or attack plant life.[15] Biological weapons can also be delivered through contamination of food and water supplies. Most experts agree that the most effective way is to contaminate the air with an aerosolized agent that infects people or animals when they inhale it. The Soviet/Russian program reportedly developed highly-effective techniques to aerosolize agents.[16] Many sources confirm that the Soviet/Russian BW program refined delivery systems for biological agents by conducting tests on primates at Vozrozhdeniye Island.[17] The Soviet Air Force reportedly equipped some aircraft specifically to carry out biological attacks. One type of airplane had the capacity to spray biological agents. Another was designed to carry cluster bombs, with cantaloupe-sized bomblets that could spin and spread disease as they fell from the sky.

Revelations about the Soviet/Russian BW Program

In 1979, at least sixty-eight people died when anthrax spores were released from a Biopreparat production facility in Sverdlovsk, Russia.[18] Although suspicions were raised from 1979 onward, the United States did not verify that the deaths had been connected with the Soviet biological weapons program until 1992.[19] Some information became available in 1989, when Vladimir Pasechnik, the former director of a Biopreparat facility, defected to Great Britain. He revealed that the magnitude

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[12] Mangold and Goldberg, *Plague Wars,* p. 198.

[13] See Miller *et al*. *Germs,* p. 166-167.

[14] Zobel, Enrique. "A Matter of Conscience: The real deal about nuclear, biological and chemical attacks," *Business World*. November 14, 2001. p. 4

[15] Ban, Jonathan. "Agricultural Biological Warfare: An Overview." June 2000.

[16] Alibek, Ken. Address at a conference entitled "Globalization and Infectious Diseases: Institutions, Policies, and the Threat of Bioterrorism." Held at the Johns Hopkins University School of Advanced International Studies (SAIS) in association with Novartis Corporation, Washington, DC. November, 16, 2001.

[17] Mangold and Goldberg, *Plague Wars,* pp. 94-95.

[18] Alibek and Handelman. *Biohazard.* pp. 70-86.

[19] Miller *et al. Germs* pp. 79-82, 93-94, 134-135, 143-144, 175, 178, 221. See, also, *Anthrax at Sverdlovsk : U.S. Intelligence on the Deadliest Modern Outbreak* National. Security Archive Electronic Briefing Book No. 61 Edited by Robert A. Wampler and Thomas S. Blanton November 15, 2001.

and lethality of the Soviet/Russian BW program far exceeded the assessments by U.S. and British intelligence sources.[20]

Early in 1992, Russia's President Boris Yeltsin publicly acknowledged the existence of an active Russian BW program. He vowed to end the program, but his efforts were reportedly thwarted by some in his military establishment, who continued the program. In September of 1992, these military officials represented Russia in negotiations with the United States and Great Britain that sought to establish an inspection process to confirm the absence of BW production. Russia initially consented to U.S. and British inspections at Russian BW facilities, but then refused to sign the "Trilateral Agreement" unless the United States and Great Britain accepted reciprocal inspections at private pharmaceutical companies in their countries. Some in Russia claimed that the United States and Great Britain were violating the BWC. After inspecting U.S. facilities, Russian inspectors claimed they found evidence of an American BW program. Yet Russia never gave U.S. and British inspectors access to military BRPC's in Russia.[21]

In 1992, Kanatjan Alibekov, who has changed his name to Ken Alibek, defected to the United States. He had been second in command in the Soviet/Russian BW program. In his debriefings with U.S. officials, Alibek confirmed and expanded on Pasechnik's revelations. Alibek has frequently testified before Congress about the Soviet/Russian BW program and about U.S. efforts to mount a defense against biological attacks.[22]

The Threat Posed by the Soviet/Russian BW Program

Many observers believe that the legacy of the Soviet/Russian BW program might pose a significant threat both to the Russian people and to the security of the United States. There are several sources for these concerns.[23]

First, experts fear that the contamination at Vozrozhdeniye Island could pose a threat to surrounding areas. Experts believe that the ground on the island has absorbed biological agents scattered during weapons tests. Furthermore, the Aral Sea is shrinking, and some fear that rodents might soon be able to travel between the island and the mainland, possibly spreading disease to a population already sickened by environmental degradation and pollution.[24] Natural environments surrounding

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[20] Obituary of Vladimir Pasechnik. *The Times Newspapers,* November 21, 2001.

[21] Mangold and Goldberg, *Plague Wars*, 170-176.

[22] Although Alibek is frequently cited as a source for information about Russia's BW program, some U.S. experts have challenged his assertions. They have focused, specifically on his claims about Soviet/Russian success with combining Ebola and smallpox, and his assessment of equipment that was discovered in a BRPC in Kazakhstan. Miller *et al. Germs*, p. 220, 226, 292-293.

[23] Tucker, Jonathan. "Bioweapons from Russia, Stemming the Flow." *Issues in Science and Technology Online*. Spring 1999.

[24] Miller *et al. Germs*, p. 180-182

many other BRPCs may also be degraded due to widespread environmental pollution and, possibly, the leakage of some biological weapons agents into the soil.

Second, reports indicate that many BRPCs in former Soviet states are in bad physical condition. These BRPCs have not been able to maintain advanced biosafety containment laboratories in the post-Soviet economic environment. Experts fear that accidental release of pathogens could occur at many of these sites.[25] Nevertheless, some experts believe that, despite the degraded condition of many BRPCs, Russia could use the remaining expertise and infrastructure to reactivate an offensive biological weapons program.

Third, many experts believe that biological weapons capabilities in former Soviet states could be vulnerable to theft or sale.[26] There are reports that the mafia and warring ethnic factions within Russia have tried to obtain biological weapons capabilities.[27] Personnel at BRPCs in former Soviet states are generally poorly paid, which, some believe, could motivate them to steal and sell dangerous pathogens, weapons technologies, or instructions related to BW development and production.[28] Seed cultures of pathogens might also be smuggled out of the BRPCs.

The United States does not have a complete knowledge of the biological weapons capabilities in the Soviet/Russian BW complex, and therefore, may not have vaccines or antibiotics that could provide a defense against infection. U.S. biodefense efforts have increased since September 11, 2001, but many public health officials stress that U.S. preparedness for a biological attack is still inadequate. In addition, according to many experts, biological weapons have several characteristics that could make them attractive to terrorist groups and hostile nation-states – they can produce mass casualties and incite panic;[29] it could be difficult to trace the perpetrator of a biological attack;[30] and they could provide an "asymmetric means" of challenging "America's overwhelming conventional and nuclear war-fighting strength."[31]

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[25] U.S. General Accounting Office. "Effort to Reduce Former Soviet Threat Offers Benefits, Poses New Threat." GAO/NSIAD-00-138. April 2000.

[26] *Ibid*.

[27] Alibek and Handelman, *Biohazard*, pp. 176-177*;* See also, Miller *et al. Germs*, p. 211

[28] Smithson, *Toxic Archipelago*.

[29] "Chemical and biological weapons can produce panic more disastrous than the agents themselves, and are much easier to develop and conceal." Barclay, Glen. "Bioweapons are the most deadly threat." *Courier Mail*. Nationwide News Pty Limited. November 8, 2001, p. 17.

[30] Alibek and Handelman, *Biohazard* p. 176.

[31] U.S. Senate, Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, and Federal Services. Statement of Dr. Anna Johnson-Winegar, Deputy Assistant to the Secretary of Defense for Chemical and Biological Defense. October 17, 2001.

Some sources report that representatives of Iran and Al-Quaeda[32] have attempted to recruit former Soviet scientists with BW expertise. According to George Tenet, the Director of Central Intelligence, these scientists possess expertise that could confer "the advantage of technological surprise" on enemies of the United States.[33] Furthermore, hostile nations and terrorist groups might offer salaries significantly higher than the scientists' current, often very low, incomes.[34]

According to some observers, this problem might be overstated. Although exact statistics are not available, the vast majority of Soviet weapons scientists apparently either remained in former Soviet states or migrated to the United States and Britain. The desire of remaining Soviet weapons scientists to stay rooted in their home communities near relatives and friends could make it difficult for proliferating groups to lure them elsewhere. However, a Carnegie Endowment report on nuclear and missile scientists, released in April 2001, indicated that although many former weapons scientists once hoped the economic crisis would pass, now some of them may migrate because they fear their situation will not improve. Some scientists also apparently feel that it would be better to be paid to work for a proliferating state or sub-state group than to become involved in organized crime.[35] In addition, BW scientists could still serve the interest of proliferators without traveling or migrating if they provided consultation, shared weapons secrets over the internet, or stole a tiny seed culture of a genetically-altered pathogen and passed it into the hands of proliferators.[36]

The U.S. Response

Policy Objectives for Nonproliferation Efforts

Since 1995, the United States has gained access to many BRPCs in former Soviet states and has sought to prevent proliferation of BW capabilities. These efforts are directed toward several policy objectives, including:

- Increasing transparency at BRPCs that once participated in the Soviet/Russian BW program;
- Securing or destroying pathogens and weapons technology so that they are not sold, stolen, accidentally deployed or leaked, or used to reactivate a biological weapons program in Russia and/or other former Soviet states;

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[32] Miller *et al*. *Germs*, pp. 205-207, 209-212, 228-229, 280. See, also, "Evidence Indicates Al Qaeda Had Russian Help Developing Anthrax." New York. *PRNewswire*. December 9, 2001.

[33] Miller *et al*. *Germs*, p. 287.

[34] *Ibid*, pp. 205-206

[35] Tikhonov, Valentin. *Russia's Nuclear and Missile Complex: the Human Factor in Nonproliferation*. A Report by the Non-proliferation Project of the Carnegie Endowment for International Peace. 2001

[36] Smithson, Amy. *Toxic Archipelago*.

- Redirecting biological weapons scientists towards peaceful pursuits and discouraging them from interacting with terrorist groups or proliferating states;

- Strengthening the United States' preparedness for biological attack.

Two secondary goals are strengthening the scientific research and development capability of former Soviet states, and reinforcing "the transition to market-based economies responsive to civil needs."[37] The United States funds and administers several programs that are designed to meet these objectives; these are summarized on the Table that appears at the end of this report.

The State Department

The Science Centers. In 1992, the United States, Japan, the European Union, and Russia established the International Science and Technology Center (ISTC) "to develop, approve, finance, and monitor science and technology projects for peaceful purposes" in former Soviet states. The Russian parliament initially resisted the establishment of the ISTC, but the Center began making grants to nuclear, chemical, and biological weapons scientists in 1994.[38] A similar organization called the Science and Technology Center in Ukraine (STCU) was founded in July 1995. It distributes grants to former weapons scientists in Ukraine, Uzbekistan, and Georgia. The STCU and the ISTC have tax-exempt status and their employees have diplomatic status. Scientists who receive these grants may continue to pursue their regular jobs, but these grants seek to provide them with enough income to reduce their incentive to sell their knowledge to other nations.

In FY2002, the Administration requested and Congress appropriated $37 million to the ISTC and STCU. When making grants to former Soviet scientists, the ISTC and STCU seek to prevent the misappropriation of funds. According to the GAO, "Since 1994, the International Science and Technology Center has directly deposited grant payments into project participants' individual bank accounts, which prevents the institutes from diverting funds for unauthorized purposes."[39] In addition, both centers have the right, the responsibility, and the power to audit the grants they make.[40]

The Science Centers provide a framework for various agencies in the United States government to engage in collaborative research with former weapons scientists. The Department of State serves as the lead agency. As is noted below, the Departments of Health and Human Services, Agriculture, Energy, and Defense all fund projects through the ISTC and STCU to engage Russia's biological weapons

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[37] Department of Defense. Cooperative Threat Reduction Program. Biological Weapons Proliferation Prevention.

[38] Smithson, Amy, *Toxic Archipelago* pp. 22-46. For a detailed account of the establishment and functioning of the ISTC, see Schweitzer, Glenn E. *Moscow DMZ : the Story of the International Effort to Convert Russian Weapons Science to Peaceful Purposes.* Armonk, N.Y. : M. E. Sharpe. 1996.

[39] GAO/NSIAD-00-138.

[40] Amy Smithson. *Toxic Archipelago*, pp. 32-33.

scientists. The Environmental Protection Agency is also developing some collaborative research proposals.

Private companies, universities and other private organizations help develop Science Center projects into sustainable, commercially competitive enterprises. The ISTC Partner Program facilitates collaboration between private organizations and BRPCs in former Soviet states, and provides private organizations with the same advantages, such as tax-exempt status and auditing capabilities, that it provides U.S. government agencies. According to the State Department, this program has contributed over $20 million annually to the ISTC and STCU.[41]

Science Center projects also include scientists in former Soviet states who did not participate in the Soviet/Russian BW program. According to the U.S. participants, incorporating non-weapons scientists promotes the goal of integrating former weapons scientists into the mainstream scientific community.[42]

Redirection of Biotechnical Scientists Program. Congress has appropriated funding for the Redirection of Biotechnical Scientists Program through the State Department, under the Freedom Support Act (P.L. 102-511). The Administration has requested $20 million for this program for FY2003. In prior years, funding for the program was in the State Department's Newly Independent States (NIS) Account. Beginning in FY2003, funding will be in the Non-proliferation, Anti-terrorism, Demining, and Related Activities (NADR) Account. The State Department allocates this funding among programs in the Departments of Agriculture, Health and Human Services, and the Environmental Protection Agency.

Department of Agriculture. In 1998, the Agricultural Research Service (ARS) of the United States Department of Agriculture (USDA) became involved in the Redirection of Biotechnical Scientists Program by launching the ARS-Former Soviet Union Scientific Cooperation Program. ARS scientists collaborate with former BW scientists who have expertise in animal and plant diseases. This program is intended to:

- Establish collaborative, mutually beneficial research;
- Maintain substantial contact between FSU and ARS scientists through reciprocal visits;
- Optimize collaboration at the scientist level and share success between both partners.[43]

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[41] Statement of Deputy Assistant Secretary of State Vann Van Diepen before the Senate, Committee on Governmental Affairs, Subcommittee on International Security, Proliferation, Federal Services. Hearing on the Nonproliferation Assistance Coordination Act. November 19, 2001.

[42] HHS briefing for the National Research Council's Committee on Assessing Research Proposals and Projects of Russian Biology Institutes.

[43] USDA briefing for the National Research Council's Committee on Assessing Research Proposals and Projects of Russian Biology Institutes.

As of December 2001, ARS had nine on-going projects in Russia and four on-going projects in Kazakhstan. The program's U.S. participants were also developing new projects with institutes in these two nations. Twenty-three proposals were under review involving four former BW institutes in Uzbekistan. The ARS-Former Soviet Union Scientific Cooperation Program received $550,000 for FY1998, $2 million for FY1999, $6.98 million for FY2000, $6 million for FY2001 and expects $5 million in FY2002.

Department of Health and Human Services. At the request of the State Department and Department of Defense, the Department of Health and Human Services (HHS) established the Biotechnology Engagement Program (BTEP) in March 1999. The program focuses on biodefense research and high-priority public health problems in former Soviet states. Experts argue that this program can benefit the United States because some Soviet/Russian innovations, such as aerosolized vaccines for mass immunization,[44] might strengthen U.S. preparedness for a biological attack.[45] American scientists who participate in BTEP projects come from the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), U.S. academic institutions, and HHS agencies, including the Centers for Disease Control and Prevention (CDC), the National Institutes of Health (NIH), and the Food and Drug Administration (FDA).[46] As of November 2001, BTEP had completed two projects, had nine ongoing projects, sixteen projects in the final stages of authorization, and an additional twenty-nine proposals under review. Plans for FY2002 include development and implementation of the Applied Epidemiology Training Program and developing a "grantsmanship" training program for researchers in former Soviet states.[47] The Biotechnology Engagement Program (BTEP) received $4.8 million for FY1999, with a 50% restriction on funding to Russia, $11 million in FY2000, $10 million in FY2001 and $9 million in FY2002. The budget includes a request for $10 million for FY2003.

Environmental Protection Agency. The Environmental Protection Agency is also becoming involved in collaborative research with former BW scientists; these projects are exploring the environmental effects of BW. It received $1.02 million for its involvement in the Redirection of Biotechnical Scientists Program in FY2001. It has allocated approximately $1 million to specific projects, but has not yet notified Congress of these obligations.

Department of Energy

The Department of Energy's (DOE) Initiatives for Proliferation Prevention (IPP) Program unites scientists from the ten U.S. National Laboratories with industry partners and former nuclear, chemical, and biological weapons scientists in former

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[44] Miller *et al. Germs*, p. 180.

[45] McMurray, Jeffrey. "Nunn: USSR Weapon-Makers May Help." *Associated Press.* October 25, 2001.

[46]HHS briefing for the National Research Council's Committee on Assessing Research Proposals and Projects of Russian Biology Institutes.

[47] U.S. Department of Health and Human Services. BTEP Annual Report, FY2001.

Soviet states.[48] Some IPP programs are funded through the ISTC, others are not.[49] IPP seeks to redirect underemployed and unemployed former Soviet weapons scientists to commercial ventures by involving them in market-driven collaboration with U.S. labs and industry partners. The involvement of industry partners makes IPP collaborative research projects different from those sponsored by HHS, the EPA, and the USDA. In FY2002, Congress appropriated $54 million ($39 million in the Energy and Water Appropriations Bill and $15 million in the Emergency Supplemental Appropriations Bill), for the Russian Transition Initiative, a program that combines IPP with DOE's Nuclear Cities Initiative. In recent years, roughly 20% of IPP funding has gone towards the BW engagement effort,[50] which is relatively new compared to the IPP nuclear effort. As of November 2000 according to DOE, the IPP Program had "engaged 20 biological institutes and almost 600 scientists, approved more than 55 projects, and allocated over $12 million for collaboration with former biological weapons facilities."[51] DOE hopes that several IPP biological projects might bring their results to market in the near future.

Department of Defense

The Department of Defense (DOD) Defense Cooperative Threat Reduction Program (CTR) includes the Biological Weapons Proliferation Prevention Program (BWPP). The Administration requested, and Congress appropriated, $17 million for this effort in FY2002. It has three major components: biosecurity and biosafety enhancements, collaborative research, and facilities and equipment dismantlement.

Biosafety and Biosecurity Enhancement Projects seek to ensure the secure and safe storage and handling of biological pathogens at biological research centers.[52] They seek to counter both potential outside and inside actors who might steal or sell BW capabilities. These projects also seek to establish a dialogue between U.S. and former Soviet scientists to allow for the identification of facilities and equipment that could be dismantled. There are currently at least six DOD biosafety and biosecurity projects, with six more in the planning stages. The ongoing projects will institute integrated systems to consolidate, store, secure, and account for pathogens. The projects will also develop and implement programs that restrict personnel access and hold personnel accountable for their activities inside the facilities. DTRA explicitly avoids "state of the art" systems and instead institutes standard, industry-proven

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[48] U.S. Department of Energy. Budget Request for FY 2000; Hearing before the U.S. House of Representatives Committee on National Security Subcommittee on Military Procurement, March 4, 1999. See also, Chase, Marilyn. "Turning Swords into Plowshares," *Wall Street Journal*. P. B1. November 20, 2001.

[49] When IPP projects are funded outside the framework of the ISTC or STCU, a tax-exempt organization serves as a contractor to DOE and deposits grant money in the accounts of individual scientists in the same way the Science Centers do.

[50] Interview with IPP official.

[51] "Energy Department's Idaho Lab Teams with Russia to Establish Ecological Biotrade Center." DOE Press Release No. R-00-287. November 14, 2000.

[52] Defense Threat Reduction Agency, Cooperative Threat Reduction Projects in Russia.

systems.[53] DOD funds and implements the BioSafety and BioSecurity Enhancement projects through the ISTC and STCU. Costs for completed BioSafety and BioSecurity Enhancement projects are expected to range from $5 million for a small BRPC to $15 million for a large BRPC.[54]

The Collaborative Research Program is designed to "prevent the proliferation of BW technologies, increase transparency, and enhance US force protection capabilities through research projects with former BW scientists at the BRPCs."[55] Through 2000, DOD had funded projects that "employed more than 350 former biological weapons scientists from seven institutes in bio-defense and public health projects of interest to the United States."[56] The BWPP collaborative research program has significantly expanded since then. On average, the total cost of a BWPP Collaborative Research Project is approximately $700,000, inclusive of project management costs, logistical costs, compensation of scientific collaborators and all other costs.

The BWPP Dismantlement Projects are designed to complicate reconstitution of a BW program and prevent proliferation of BW technology by eliminating infrastructure and equipment at biological research and production centers. The first major dismantlement project occurred at Stepnogorsk, the massive BRPC in Kazakhstan. The program is dismantling the entire facility. The project is currently in its final phase, with the total cost projected to be $10 million. Future dismantlement projects at other BRPCs will eliminate BW equipment, enable BRPCs to lower operational costs by consolidating their operations in fewer structures, and prepare the BRPCs for collaboration with U.S. industry partners. The United States has also agreed to try to eliminate the contamination remaining on Vozrozhdeniye Island, the Soviet BW testing site in the Aral Sea.

Department of Commerce

The Department of Commerce indirectly supports interagency BW nonproliferation efforts through its Special American Business Internship Training (SABIT) program. The SABIT program was instituted in 1990 to support economic restructuring in former Soviet states, and it funds short-term training at U.S. companies for specialists from former Soviet states. SABIT also offers courses in Russia that provide participating groups with an assessment of their prospects for product commercialization and market success. The Department of Commerce also provides BISNIS, the Business Information Service for the Newly Independent States.

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[53] Defense Threat Reduction Agency. Biological Weapons Proliferation Prevention project plans.

[54] Ibid.

[55] Ibid.

[56] Ibid.

Non-Governmental Organizations (NGOs)

The United States Industry Coalition (USIC), a non-profit association of U.S. companies and universities, works to facilitate industry involvement in U.S. nonproliferation efforts in former Soviet states by serving as an advocate for their interests.[57] For example, USIC strives to ensure the Intellectual Property Rights of its member organizations. Universities and companies involved in IPP programs are required to be members of the USIC.

The Civilian Research and Development Foundation for the Independent States of the Former Soviet Union (CRDF), is a non-profit organization created by the United States in 1995 to facilitate mutually-beneficial scientific and technical collaboration between the United States and former Soviet states. The CRDF is funded through government contracts and several private foundations to provide services such as the administration of grants, organization of meetings, and merit-based technical review of proposals. Through its Partner Program, the CRDF matches U.S. companies with scientists and engineers in former Soviet states who have skills the companies need. The CRDF operates a Collaborative Research Program entirely devoted to nonproliferation of BW capabilities from former Soviet states; this program primarily supports the Collaborative Research component of DOD's Biological Weapons Proliferation Program.

The National Academies have actively supported U.S. efforts to prevent proliferation of BW capabilities by providing advice on matters related to science and technology. For example, the Committee on Assessing Research Proposals and Projects of Russian Biology Institutes and the Committee on Dual-Use Technologies, Export Control, and Materials Protection, Control, and Accounting are involved in U.S. nonproliferation efforts. Many think tanks and nonprofit organizations also provide grant money, outreach and education programs, and expertise in support of U.S. government efforts to prevent proliferation of BW capabilities from former Soviet states.

Implementation Issues

The U.S. effort to prevent proliferation from the former Soviet biological weapons complex is similar, in many respects, to its effort to prevent proliferation from the nuclear weapons complex. In both cases, the weapons complex suffers from degraded security systems that remain from the Soviet era,[58] the degradation of the physical plant at the facilities, a lack of income for weapons scientists, reported struggles between hard-liners and reformers in former Soviet states, and the presumed desire of terrorists and hostile nation-states to obtain the weapons capabilities

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[57] USIC's revenues from government contracts were $737,987 in FY2000 and $925,077 in FY2001. See USIC Annual Report 2000-2001. See also, U.S. Department of Energy. "Department of Energy Announces Consumer and Environmental Projects With Former Soviet Biological Weapons Scientists & U.S. Industry Partners." July 24, 2000.

[58] Kitfield, James. "Nuclear Nightmares." *The National Journal*. December 14, 2001.

remaining in both complexes. However, there are significant differences between the biological weapons and nuclear weapons complexes and these differences give rise to significant differences in U.S. nonproliferation programs.

Absence of U.S. Biological Weapons Complex

One key difference between the nuclear and biological nonproliferation programs is the lack of a U.S. equivalent to the former Soviet biological weapons complex. The U.S. BW program closed during the Nixon administration. Whereas scientists in the U.S. nuclear weapons complex were logical counterparts for former Soviet nuclear scientists, it has taken time to identify and recruit suitable American counterparts for BW scientists. Furthermore, whereas a sophisticated understanding of nuclear weapons technology was readily available to guide U.S. efforts to prevent proliferation of nuclear weapons from former Soviet states, U.S. understanding of biological weapons technology was more limited. Through BW nonproliferation efforts in former Soviet states the U.S. has been learning about Soviet/Russian BW technology and many observers believe that this knowledge has enhanced U.S. national security.

Mixed Jurisdiction

When addressing concerns with Russia's nuclear weapons facilities and weapons complex, the United States could work almost exclusively with Russia's Ministry of Defense or Ministry of Atomic Affairs (MINATOM). In contrast, many agencies in the Soviet government shared jurisdiction over the Soviet biological weapons complex. In Russia today the Ministries of Agriculture, Health, Industry, Science and Technology, Defense, and other agencies claim jurisdiction over various aspects of the BW complex. In some cases, the United States can develop projects with individual BRPCs and individual scientists at the grass-roots level, without interacting with any Russian government agency. However, mixed jurisdiction can complicate efforts to dismantle facilities or destroy weapons technology. The United States must negotiate an implementing agreement with the government agencies that own and control specific facilities and technology before it can act directly to dismantle or destroy property. This process is difficult to complete when more than one agency claims jurisdiction.[59] Therefore, biosafety, biosecurity, and dismantlement projects at BRPCs are funded indirectly, through the ISTC. Some argue that this is an inefficient mechanism for managing these kind of projects.

Dual-Use Technology

Most of the technology required for development and production of nuclear weapons is unique to the weapons complex. But the technology associated with biological weapons is also used in medical research, pharmaceutical production, and public health work. Therefore, according to some, if the United States helps fund non-military research using biological technologies, it might risk unintentionally subsidizing a BW program.

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[59] Mixed jurisdiction is not an issue in Kazakhstan or Uzbekhistan, where the United States has negotiated implementing agreements directly with the governments of those states.

Several factors might mitigate the risk posed by the "dual-use" nature of biological weapons technology. First, before beginning cooperative projects with the United States, BRPCs must provide assurance "that they will abstain from offensive research or proliferation activities."[60] Second, ISTC/STCU personnel audit most projects. Third, U.S. agencies require U.S. participants to make on-site visits to BRPCs to ensure that the projects are meeting their stated objectives. In addition, the National Security Council has mandated that all U.S. projects involving former Soviet/Russian BRPCs must be reviewed by the Nonproliferation Interagency Roundtable.

Coordination of Interagency Efforts

According to government officials, the Proliferation Strategy Policy Coordinating Committee, or PCC, which is chaired by a National Security Council senior director, provides the interagency oversight and policy implementation of all U.S. nonproliferation assistance to the states of the former Soviet Union. This committee has representatives from State, Defense, Energy and other concerned agencies. This committee has several working groups, or subcommittees, that are designed to ensure day-to-day coordination among programs in different agencies. Within this structure, the Nonproliferation Interagency Roundtable (NPIR) reports to the Proliferation Strategy sub-PCC on Bio/Chem Proliferation.

For the past four years, the NPIR has sought to coordinate all U.S. government efforts to prevent BW proliferation from former Soviet states. The Roundtable is chaired by a representative of the State Department and comprised of representatives of various agencies; it reports directly to the National Security Council. The Roundtable helps the various agencies prevent duplication of efforts and seeks to ensure that, together, they address the appropriate priorities. At monthly meetings, members discuss and coordinate implementation issues, such as travel to the FSU or guests arriving from the FSU. When reviewing proposals for collaborative research projects, the Roundtable can reject or mandate revisions in proposals for projects that might reinforce or extend BW capabilities.[61]

The Nonproliferation Interagency Roundtable is adjusting its procedures to keep up with the increasing number of projects. It plans to develop a comprehensive database to facilitate systematic coordination and monitoring of projects.[62]

Measuring the Results

In April 2000 the General Accounting Office (GAO) reported that collaborative research projects involving former BW scientists had "helped to discourage scientists from cooperating with countries of proliferation concern and terrorist groups, while

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[60] GAO/NSIAD-00-138

[61] Correspondence with a State Department official.

[62] Interview with a State Department official.

promoting openness at more than 30 former Soviet biological weapons institutes."[63] GAO also reported that about 1,655 former employees of the Soviet/Russian BW program received funding through the ISTC in 1999. Since that time, U.S. biological nonproliferation efforts have expanded as confidence in their effectiveness has grown. Furthermore, these cooperative projects provide the United States with continuous working-level access to Russia's BW sites. Some U.S. participants state that this cooperation allows for better verification than 2-day inspection visits because cooperation involves long-term, routine interaction.[64]

Some observers contend that the United States benefits from these efforts in other ways besides nonproliferation. The research can also address non-weapons related concerns. For example, using a strain of brucellosis from their collection of pathogens, former Soviet weapons scientists are prepared to help the United States produce a more effective vaccine for bison in Yellowstone park.[65]

As of March 2002, more than 40 BRPCs throughout the former Soviet Union have engaged in cooperative projects with the United States. These projects have helped the United States assess the extent to which these facilities were involved in the development and production of biological weapons capabilities. According to State Department officials, approximately 30 of these were deeply involved in the Soviet/Russian biological weapons program, and therefore, are considered to pose a significant risk for contributing to proliferation. The others were less integrated into the Soviet/Russian BW complex and, therefore, pose less of a proliferation risk.

Some known BRPCs do not participate in U.S. programs; others, such as the State Research Center for Virology and Biotechnology ("Vector") in Novosibirsk, Russia, and the State Research Center for Applied Microbiology (SRCAM) in Obolensk, participate in multiple projects. The Russian Ministry of Defense has denied the United States access to four BRPCs under its jurisdiction.[66] Furthermore, as cooperation has expanded, the United States has discovered additional BRPCs that once participated in the Soviet/Russian BW programs.

Some view the interpersonal relationships built between U.S. participants in these efforts and former Soviet weapons scientists as a significant part of these efforts. In addition to cooperating on projects, U.S. participants and their counterparts in former Soviet states share meals, get to know one another's families, and spend leisure time together. Furthermore, some argue that contact with U.S. companies, NGOs, and government agencies has decreased the social and institutional isolation

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[63] GAO/NSIAD-00-138

[64] For descriptions of ways in which Russian hosts have tried to conceal BW capabilities from U.S. inspectors see Mangold and Goldberg, *Plague Wars*. pp. 62-140.. See also, Alibek and Handelman, *Biohazard*, pp. 137-224

[65] "Former Soviet Union weapons scientists may help solve brucellosis," *Associated Press.* October 8, 2001.

[66] They are the Institute of Virology at Sergeyev Posad (formerly Zagorsk), the Center for Military Technical Problems of Biodefense in Ekaterinaburg (formerly Sverdlovsk), the Kirov Institute of Microbiology in Kirov, and the Kirov-200 Institute in Strizhi.

of Russia's biological weapons scientists. Several people involved in work with former BW institutes and scientists have expressed the view that these interpersonal and institutional relationships are profoundly affecting the decisions weapons scientists are making about how to use their expertise.[67]

Issues for Congress

The Security Assistance Act of 2001

The Security Assistance Act of 2001 (S.1803) has several sections that are relevant to U.S. policy regarding BW capabilities in former Soviet states.[68] The following discussion is based on Senate action, only. Section 304, entitled "International Nonproliferation Export Control Training," gives the President authority to provide education and training to foreign personnel to enhance their ability to implement export controls that might contribute to nonproliferation activities. Section 305 extends the Soviet Scientists Immigration Act of 1992 and increases the number of scientists that can be relocated under that act from 750 to 950. Some people advocate inviting former weapons scientists to come to the United States to work, as a way of preventing proliferation of weapons expertise. They argue that the U.S. economy and U.S. biodefense efforts would benefit from the expertise of these scientists. Some who oppose this approach argue that it would cost less money to employ a scientist in a former Soviet state than in the United State Some also argue that it is in the U.S. national interest to invest in the science and technology sector of former Soviet states and support their transitions to market economies.

The Russian Federation Debt Reduction for Nonproliferation Act. Subtitle B of the Security Assistance Act of 2001, the Russian Federation Debt Reduction for Nonproliferation Act of 2001, is designed to encourage Russia to increase its own budget allocations for nonproliferation programs. Russia and other former Soviet states have supported BW nonproliferation efforts in the past by providing infrastructure, staff, and funding to organizations such as the ISTC and STCU. They also contribute to cooperative projects by providing funding or in-kind resources, such as equipment and utilities, to the BRPCs. On the other hand, many experts believe that Russia and the other former Soviet states have sometimes pursued activities that are inconsistent with U.S. nonproliferation goals. For example, a recent CIA report charged that, "During the first half of 2001, Russian entities remained a significant source of dual-use biotechnology, chemicals, production technology, and equipment for Iran."[69]

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[67] Interview with a U.S. contractor and with several officials of U.S. government agencies.

[68] The Senate passed S1803 by a voice vote on December 20, 2001, and the bill was referred to the House Committee on International Relations as of January 23, 2002.

[69] U.S. Central Intelligence Agency. *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions: 1 January Through 30 June 2001*, January 2002. The Russian Foreign Ministry (continued...)

The Russian Federation Debt Reduction for Nonproliferation Act grants the President the authority to reduce Russia's Soviet era debt to the United States, through a variety of mechanisms, if Russia uses the funds that would have been applied to debt service for projects designed to reduce the risk of proliferation from Russia's nuclear, chemical, or biological weapons complexes. In a further effort to shape Russia's policies on nonproliferation, the legislation states that the President cannot implement the "debt for nonproliferation swap" until Russia makes "material progress in stemming the flow of sensitive goods, technologies, material, and know-how related to the design, development, and production of weapons of mass destruction and the means to deliver them to countries that have been determined ... to have repeatedly provided support for acts of international terrorism."

Supporters of this legislation argue that Russia's debt creates such a burden to the state that Russia would be unlikely or unable to devote its own funds to nonproliferation projects while servicing its debt. Furthermore, they argue that this legislation might provide Russia with an incentive to place a higher priority on nonproliferation because it could expect relief from some of its debt. Others, however, note that the United States does not hold much of Russia's debt, so any effort to link nonproliferation with debt relief would have to win the support of other nations, such as Germany, who hold a larger portion of the debt.

The Non-Proliferation Assistance Coordination Act of 2001. The Non-Proliferation Assistance Coordination Act of 2001 was introduced in late 2001 and incorporated into the Security Assistance Act of 2001 as Subtitle C. It seeks to address congressional concerns about interagency coordination of all U.S. nonproliferation efforts in the former Soviet States. It establishes an interagency committee that will monitor U.S. nonproliferation efforts in the former Soviet Union and coordinate U.S. policy with respect to the implementation of those efforts.

When considering this legislation the International Security, Proliferation, and Federal Services Subcommittee of the Senate Government Affairs Committee heard testimony on November 14, 2001, that emphasized the potential benefits of improved coordination of nuclear nonproliferation programs, in general. In contrast, some experts stated that interagency efforts to prevent proliferation of biological weapons were "well-coordinated."[70] Although few experts have focused on the implementation of the biological weapons programs, most who do tend to agree with this assessment. The General Accounting Office reviewed the programs in 2000, and the Bush

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[69](...continued)
disputed the charge stating that "Russia strictly meets its international obligations to control the export of sensitive trade and technology." Bellaby, Mara D. "Russia Rips CIA Report on Technology." *Associated Press*. February 7, 2002.

[70] Leonard Spector emphasized the need for greater interagency coordination of nonproliferation programs in general. However, speaking of bio weapons he said, "Through a **well-coordinated** interagency program to create non-defense employment opportunities for former Soviet BW scientists, the Clinton administration successfully engaged a number of former Soviet BW sites in Russia, Kazakhstan, and Uzbekistan." Senate Committee on Government Affairs. November 14, 2001.

administration reviewed them in 2001 and neither identified coordination among them as a problem.

Funding

Congress and the Bush administration have demonstrated continued and growing support for U.S. efforts to prevent proliferation of biological weapons from former Soviet states. Upon completing a detailed review of U.S. nonproliferation and threat reduction assistance to Russia and the other former Soviet states, the Bush administration identified the "Redirection of Biotechnical Scientists Program" as one of four programs to be expanded.[71] In the National Defense Authorization Act for Fiscal Year 2002, Congress approved the President's request for $17 million for DOD's efforts in biological weapons proliferation prevention in Russia.[72] In the emergency supplemental appropriations bill passed after the September 11 attacks, Congress added another $30 million " for the purpose of supporting expansion of the Biological Weapons Redirect and International Science and Technology Centers programs, to prevent former Soviet biological weapons experts from emigrating to proliferant states and to reconfigure former Soviet biological weapons production facilities for peaceful uses."[73] Furthermore, in its 2000 report on the BW nonproliferation programs, published before the anthrax attacks of October 2001, the GAO estimated that the United States would spend around $220 million on BW nonproliferation between 2000 and 2004. Most experts agree that this amount may increase now that attention has focused more sharply on the threat of biological weapons proliferation from Russia.

Some experts argue that the United States should increase its efforts to stem proliferation from the former Soviet Union. In January 2001 a panel headed by Lloyd Cutler and former Senator Howard Baker found that, "Current nonproliferation programs in the Department of Energy, the Department of Defense and related agencies have achieved impressive results thus far, but their limited mandate and funding fall short of what is required to address adequately the threat."[74] Some also point out that opportunities to redirect former BW scientists, to secure dangerous pathogens, and to dismantle BW equipment continue to arise as U.S. access to the former Soviet/Russian BW complex expands. Furthermore, according to several U.S. government officials, recent increases in funding for existing programs, while welcome, has been surpassed by an increasing number of viable project proposals.

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[71] White House Fact Sheet, December 27, 2001.

[72] P.L.107-107.

[73] P.L.107-117

[74] Risen, James. "Nuclear Items Sold by Russia To Iran Pose An Obstacle." *New York Times.* January 11, 2001.

Alternatives for the Future

U.S. assistance to Russia's BW program has sought to support the transformation of the Soviet/Russian BW complex into a set of consolidated, safe, secure, and essentially transparent institutions. Many experts continue to support this objective, but now believe that it will take a long-term investment rather than a short-term crisis intervention.[75] The number of BRPCs known to have been part of the Soviet/Russian BW infrastructure continues to increase. Furthermore, U.S. experts are debating the best long-term strategies for preventing BW proliferation from former Soviet states. Many American participants in U.S. BW nonproliferation efforts consider that long-term nonproliferation goals might be achieved without sustaining U.S.-funded biosecurity and collaborative research projects for the remaining lifetimes of former BW scientists. But some also contend that premature disengagement from BRPCs that continue to pose a proliferation risk is not acceptable.

In recent months, U.S. government agencies and NGOs involved in these efforts have intensified their focus on moving BRPCs towards consolidation and self-sustainability, which many believe is the best way to maximize the nonproliferation benefits that can be achieved by U.S. efforts. Some overall approaches include drawing a new generation of scientists into the BRPCs and preparing BRPCs for external investment. Experts argue that a separate strategy for disengagement will have to be developed for each BRPC, because each one poses unique problems which require unique solutions.

Some analysts argue that the United States should not help the BRPCs become self-sustaining organizations. They argue that market forces will eliminate the BRPCs in former Soviet states because they cannot compete with other biotechnical research and production centers throughout the world. Others, however, counter that without international intervention, market forces might unite former weapons scientists with proliferating states and sub-state groups. Some observers consider the biological weapons complex in former Soviet states to be too isolated and underfunded to safely dismantle itself without U.S. investment. Such observers contend that the goal is not so much to make the BRPCs competitive with other BRPCs throughout the world as it is for the United States to successfully compete with proliferating groups and nation states for the BW capabilities that exist at these BRPCs.

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[75] "It became clear that any meaningful result required a more extended and creative kind of engagement . . . " Civilian Research and Development Foundation. *CRDF 1998-2000 Program Report*. p. 2.

Table 1. U.S. Programs to Assist Russia with Biological Weapons Nonproliferation

Agency	Program	Program Objective
Department of Defense	Cooperative Threat Reduction Program, Biological Weapons Proliferation Prevention (BWPP)	Redirect BW scientists through collaborative research; improve safety at Russian BW facilities in preparation for collaborative research projects; improve security at Russian BW facilities by consolidating and restricting access to pathogens; eliminate BW infrastructure and equipment.
Department of Energy	Initiatives for Proliferation Prevention	Redirect BW scientists through collaborative research; incorporate industry partners to identify market-driven projects that might produce commercial products and results
Department of State	International Science Centers Program (ISTC/STCU)	Provides grant funding to redirect BW scientists to non-military research; provides support for the development, management, and auditing of projects sponsored by other U.S. agencies
Department of Agriculture	Agricultural Research Service (ARS)-Former Soviet Union Scientific Cooperation Program	Redirect BW scientists through collaborative research on diseases that might affect plants and animals
Department of Health and Human Services	Biotechnology Engagement Program (BTEP)	Redirect BW scientists through collaborative research on public health problems
Environmental Protection Agency		Redirect BW scientists through collaborative research on environmental damage caused by biological weapons
Department of Commerce	Special American Business Internship Training Program (SABIT) Business Information Service for the Newly Independent States (BISNIS)	Facilitate business training and exchanges

Acronyms

ARS	Agricultural Research Service of the U.S. Dept. of Agriculture
BRPC	Biological Research and Production Center
BTEP	Biotechnology Engagement Program of the Dept. of Health and Human Services
BW	Biological Weapons
BWC	Biological Weapons Convention
BWPP	Biological Weapons Proliferation Prevention program
CDC	Centers for Disease Control and Prevention
CRDF	Civilian Research and Development Foundation
CTR	Cooperative Threat Reduction
DHHS	Department of Health and Human Services
DOD	Department of Defense
DOE	Department of Energy
DTRA	Defense Threat Reduction Agency
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FSA	Freedom Support Act
FSU	Former Soviet Union
GAO	General Accounting Office
IPP	Initiatives for Proliferation Prevention Program of the Dept. of Energy
ISTC	International Science and Technology Center
MINATOM	Russia's Ministry of Atomic Affairs, similar to the U.S. Department of Energy
NADR	Non-proliferation, Anti-terrorism, Demining, and Related Activities Account
NIH	National Institutes of Health
NIS	Newly Independent States
NPIR	Non-proliferation Interagency Roundtable
OSD	Office of the Secretary of Defense
SABIT	Special American Business Internship Training
SRCAM	The State Research Center for Applied Microbiology in Obolensk,
STCU	Science and Technology Center in Ukraine
USAMRIID	United States Army Medical Research Institute of Infectious Diseases
USDA	United States Department of Agriculture
USIC	United States Industry Coalition
Vector	The State Research Center for Virology and Biotechnology in Novosibirsk, Russia
WMD	Weapons of Mass Destruction