Reshaping U.S.–Russian Threat Reduction

New Approaches for the Second Decade

Findings Developed by a Joint Working Group

CARNEGIE ENDOWMENT
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Contents

Foreword

Threat reduction cooperation was created through the passage of the Nunn-Lugar legislation in November 1991 to address the acute danger posed by the potential proliferation of weapons of mass destruction (WMD) from Russia and the former Soviet Union (FSU). Implementation of the activities under this agenda began in 1992, and since then significant progress has been made in many key areas. But this year, as the tenth year anniversary of the threat reduction effort passed, it is clear that much of the agenda has lost its urgency and that many fundamental problems persist with no clear plan for resolving them.

For example, activities under the Cooperative Threat Reduction (CTR) program were virtually suspended twice in 2002 over a dispute concerning Russia's chemical and biological weapons declarations. U.S. restrictions on funding for chemical weapons destruction at Schuch'ye have created a crisis that could result in the termination of the project. Access and transparency disagreements are impeding warhead and fissile material security efforts. The redirection of weapons scientists is not producing new, lasting, and career-changing employment opportunities. And our understanding of the Russian bioweapons complex and its security needs is incomplete, and therefore efforts to manage this threat are lacking.

Threat reduction cooperation has developed into a multifaceted effort that has many participants and many political and security responsibilities placed on it. This complexity has influenced political perceptions of the effort and affected its implementation. With most of the easily understandable and politically popular projects well under way, many of the remaining threat reduction initiatives are quite different in the sense that their short-term results often are less tangible, and political constituencies for many of these activities appear to be less robust. These activities include transitioning weapons scientists and infrastructure from weapons to peaceful activities, controlling sensitive technologies and exports, and ensuring the sustainability of installed security improvements. Also, the elimination of WMD materials such as plutonium, highly enriched uranium (HEU), and chemical weapons is an expensive and politically complicated undertaking, and much remains to be completed in this area as a result.

Still, at the June 2002 Kananaskis Summit in Canada, the G-8 (Group of Eight Industrialized Countries), led by the United States, agreed to extend the partnership against the spread of weapons and materials of mass destruction for another ten years. Nations other than the United States agreed to take a much more active role in the

threat reduction process and to contribute up to $10 billion over the next decade. But only limited funding has been identified to date, and there are questions about the prioritization of the G-8 projects. It is also not clear what more financial and political support Russia will contribute over the next decade. The declaration, however, has provided a welcome and needed opportunity for thinking creatively and concretely about the future of threat reduction.

The extended commitment to threat reduction made at the Kananaskis Summit raises the central questions of how to evaluate the progress and problems of threat reduction during the past decade and how to apply the lessons learned to reform and improve the implementation of the agenda over the next decade.

To understand threat reduction's current scope and to understand what more needs to be done, the Russian–American Nuclear Security Advisory Council (RANSAC) and the Carnegie Endowment for International Peace (CEIP) undertook a process in 2002 to systematically evaluate threat reduction efforts in the nuclear, biological, chemical, and missile complexes. RANSAC started the process in February with an overview meeting and joined with CEIP in the spring to evaluate the situation in greater depth. The RANSAC–CEIP collaboration included the formation of a core group of U.S., Russian, and European technical and political specialists who participated in a series of three meetings. In essence, the four meetings constituted a series of hearings on threat reduction that revealed much new and useful information.

The meetings uncovered that threat reduction efforts in all of the WMD complexes were suffering from a very similar set of problems but that compartmentalization of these efforts had impeded crosscutting analysis of these issues and the development of strategic responses to them. This report outlines a broad set of findings regarding the Russian WMD complexes and the problems affecting the implementation of the threat reduction mission.

The RANSAC–CEIP approach was simple. A dedicated and knowledgeable group of Russian, American, and European experts was assembled to collect, digest, and judge the information provided by experts working on these programs both in and out of government and representing various disciplines (political, security, diplomatic, legal, economic, and cultural). The working group has served as an advisory board to help the authors develop and vet the findings. Some working group members agree with the assessment; others do not agree with all the findings. But all agree that the working group was able to assess fairly the current state of threat reduction efforts and the remaining risks posed by the state of the Russian WMD complexes.

We are grateful to the participants of the working group and to the various experts who provided briefings and comments during the meetings and on this final report. Special thanks go to J. Raphael Della Ratta at RANSAC, who managed the working group and workshops, and to the staffs of the Carnegie Endowment and RANSAC, including Marshall Breit, Toni Elam, Michael Roston, and Ingrid Staudenmeyer, who

summarized the sessions, crafted the meeting reports, and helped pull all of our efforts together into this report.

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Findings Developed by a Joint Working Group

The following findings were developed during a series of four working group meetings convened by the Russian–American Nuclear Security Advisory Council and the Carnegie Endowment for International Peace during 2002.

MAJOR FINDINGS

➤ Threat reduction cooperation prevents proliferation.

Threat reduction cooperation between the United States, Russia, and other FSU states—and the activities funded by European states and the G-8—has been critical in preventing the proliferation of nuclear, chemical, and biological weapons and their means of production. Threat reduction has produced significant, quantifiable results including:

- Roughly 6,000 nuclear warheads removed from deployment;
- More than 400 missile silos destroyed;
- Nearly 1,400 ballistic missiles, cruise missiles, submarines, and strategic bombers eliminated;
- Storage and transportation of nuclear material and weapons made more secure;
- 150 metric tons of weapons-grade uranium eliminated;
- A major biological weapons production plant eliminated; and
- 40,000 chemical, biological, nuclear, and missile weapons scientists provided with support to pursue peaceful research.

➤ Much of the threat reduction agenda remains to be completed.

Although significant progress has been made in key areas, more remains to be done in reducing the dangers posed in all of the weapons complexes. Roughly half of the nuclear weapons–grade material in Russia remains inadequately secure, the destruction of chemical weapons is just starting, and much remains unknown about past biological weapons activities—all of which impede threat reduction remedies. Also, many problems with threat reduction implementation have developed during

the past decade. Reform of the agenda and the acceleration of its implementation are required if key goals are to be met and the risk of proliferation successfully managed as rapidly as the threat requires. The recent G-8 pledge to provide up to $20 billion over the next decade has provided an opportunity to catalyze and accelerate progress on this nonproliferation agenda, and it should be seized upon.

- There is a particular concern about the former Soviet biological weapons (BW) complex. The security of existing pathogen libraries, the past scope of work, the current whereabouts of BW and BW-related experts, and the future disposition of the FSU biological weapons capability are all critical concerns within the threat reduction agenda.

➤ Political support for threat reduction activities remains insufficient.

Success in threat reduction requires sustained political support and the expenditure of political capital in support of the agenda by the United States, Russia, Europe, and Japan. However, truly robust political support for threat reduction is very rarely demonstrated and often is more rhetorical than real.

- Means for improving political understanding of the threat reduction agenda and providing incentives for greater political support need to be urgently identified. Tentative political support has resulted in funding limitations and restrictions, bureaucratic battles, and delayed implementation. The technical nature of much of the threat reduction work, the complexity of its implementation, the intangibility of some of its objectives, its cost and intrusiveness, bureaucratic inertia, the stigma that much of threat reduction is still foreign aid, and the still unsettled nature of Western–Russian relations all cut into political support.
- The Russian government needs to improve the overall environment for threat reduction. Consistent political commitment from the top of the Russian government is essential to ensure the long-term success of these efforts. Providing financial transparency, facility access, and legal protections are all key issues on which the Russian government should act.

➤ Threat reduction lacks a coordinated strategy.

The threat reduction agenda has expanded substantially over the past decade and scores of U.S. agencies, foreign governments and ministries, and international and nongovernmental organizations (NGOs) are involved in the process. Currently, the overall effort is not guided by any integrated or comprehensive strategy, and the review and coordination of the goals and objectives of bilateral and multilateral threat reduction programs remain inadequate. There is a need to develop a comprehensive strategy that integrates all of these efforts and provides some overall direction and

prioritization. The development of such a strategy could substantially improve the effectiveness of threat reduction and more quickly reduce proliferation risks. Without improvement in executive branch management and congressional oversight, the scope and importance of threat reduction activities will remain only partially understood by key political actors and the public, with the inevitable and recurring overlap, inefficiencies, conflicts, and inability to pursue economies of scale or cross cutting opportunities.

- No U.S. administration has embraced the many calls for a central coordinator for threat reduction activities or a comprehensive, integrated plan.
- Threat reduction efforts lack organized, streamlined congressional oversight. The various agencies implementing diverse programs are overseen by a variety of different congressional committees. As a result, no one congressional committee has a clear understanding of all the threat reduction activities, progress, and problems.
- The important issue of how best to expand threat reduction programs and principles to new regions needs to be further defined and analyzed to effectively take advantage of past lessons and current activities.

➤ Threat reduction's future results may be less tangible.

To date the most popular elements of threat reduction activities have centered on highly observable developments (eliminating missiles and submarines, securing nuclear materials, and so on). Activity in these areas will continue, but other issues such as redirecting weapons scientists, downsizing weapons complex infrastructure, destroying fissile materials, and dismantling warheads must become more prominent in the coming decade if the roots of the proliferation danger are to be addressed. These issues, however, have an uneven track record of political support and accomplishment and longer timelines for implementation. Methods of improving project accomplishment and accurate and meaningful measures of progress in these activities need to be developed to sustain political support.

➤ Financing for some key threat reduction activities is inadequate.

Over $1 billion per year is being made available for international threat reduction programs. Still, there are a number of efforts that could accelerate progress if additional funding were made available. These include redirecting weapons scientists, eliminating additional quantities of HEU, implementing plutonium disposition, ending the production of weapons-grade plutonium, converting research reactors that currently use HEU, and improving border, export, and customs control. Additional funding could also allow for expanding the scope of threat reduction. The paths

forward for financing these major activities are unclear and largely depend on a higher degree of political support than currently exists. The implementation of the G-8 Global Partnership is one possible solution, as is the exchange of Russian debt to the West for nonproliferation projects.

➤ Financing is not the only impediment to threat reduction progress.

While many threat reduction programs can use additional funding and many analyses and recommendations have tended to focus primarily on the need for increased funding, there are numerous implementation problems that are slowing or completely stalling major threat reduction activities, in some cases creating significant funding backlogs. The key problems include intelligence-gathering sensitivities, bureaucratic and political constraints, alleged noncompliance with arms control treaty requirements, and potentially larger disagreements between the United States and Russia, such as Russian nuclear cooperation with Iran. Some of these problem issues have not been systematically studied inside or outside the government, but such analysis is necessary if these serious impediments are to be overcome.

➤ Access to facilities and transparency of information are essential.

Disputes over transparency and access are major impediments to progress in threat reduction. Requests for access and transparency (including financial data) create suspicion on the Russian side and the rejection of these requests fuels resentment and hard-line attitudes on the U.S. side. Yet there is no systematic approach to the subject among threat reduction programs and no comprehensive evaluation of the subject. These issues need to be systematically studied, and the lessons learned from the histories of key programs need to be applied to the future.

➤ The economic dimensions of threat reduction are not well understood.

Insufficient attention has been paid to alternative job creation, retraining of scientists, environmental cleanup, housing, and numerous other economic and social issues that are root contributors to the proliferation threat. The deep cuts in Russian military spending and the uneven development of the Russian economy are important contributing factors to the proliferation danger. However, the very programs that are most focused on addressing the economic underpinnings of the proliferation threat in Russia and the FSU are those with the weakest performance records and political support. It has been perceived, at least in some quarters of the United States, that economic issues are not central to the U.S. threat reduction and security mission. On the other hand, Russia also exhibits unrealistic economic expectations, and systemic problems in that country often impede progress. The U.S. and Russian governments

have been reluctant to embrace alternative strategies that can be implemented to deal with these issues.

➤ Reemployment programs for scientists require new strategies.

To date, the reemployment programs for weapons scientists, while essential, are not providing many career-changing opportunities in any of the WMD complexes in Russia and the FSU. The two main strategies that governments have pursued in redirecting the scientists—science research contracting and technology-driven commercialization and business development—are inadequate. New approaches and new attitudes are required to meet this vital challenge.

- The science contracting approach has been, and remains, an essential lifeline for many weapons scientists. But the duration of most projects is short (up to three years), and many of these science projects often do not have relevance to clear global scientific challenges, as measured by general lack of interest in their results. Harnessing the experience and knowledge of the excess weapons scientists to real world problems, such as environmental remediation, energy technology development, life sciences, and nonproliferation, would provide global benefits.
- Commercially focused redirection efforts are also important and have had some successes. But government investments have yielded few real results because they have not been adequately conformed to market needs. Creating successful commercial enterprises is difficult enough in Russia because of the systemic impediments to business creation. When the additional layer of unique weapons complex impediments is added, it becomes a daunting challenge. Western governments must be willing to accept these realities and lower their expectations that commercialization in the WMD complexes will completely solve the problem of excess scientists.
- Scientist reemployment is a key area that is likely to grow in importance in the future. Decreasing weapons complex infrastructure is politically popular, but it will yield excess scientists who need to be reemployed. A more cohesive, comprehensive, integrated, and effective strategy for addressing the reemployment of scientists across the WMD spectrum needs to urgently be developed and implemented.

➤ The arms control–threat reduction relationship needs to be better defined.

Although the implementation of the Strategic Arms Reduction Treaty (START I) has provided an essential rationale for a major portion of threat reduction activities, other agreements such as the Chemical Weapons Convention (CWC) and Biological

Weapons Convention (BWC) have created delays and problems in threat reduction. In particular, the declaration requirements embodied in the CWC and BWC—and the Russian inability to meet them—have led to prohibitions on spending U.S. funds for chemical weapons destruction and hiatuses in contracting for new activities in many WMD areas. There is a need to clarify and harmonize the relationship between relevant arms control agreements and flagship threat reduction programs. New agreements such as the Treaty of Moscow and the Comprehensive Test Ban Treaty (CTBT) currently have no relation to threat reduction, but threat reduction could be instrumental in facilitating the implementation of these treaties in the future and these linkages should be explored.

COMPLEX STATUS REPORTS

Nuclear Weapons Complex

Russia maintains a Cold War–sized nuclear complex that faces many challenges. The key outstanding issues are nuclear material and warhead security, the redirection of excess scientists (35,000-40,000), the downsizing of the complex, the disposition of fissile materials, and the reduction in the production and use of fissile materials. Although there has been some progress, none of these objectives has yet been completely met, and most are not projected to be completed before the end of the decade.

Because of the substantial activity in the nuclear sector, the Russian Ministry of Atomic Energy (Minatom) is one of the stronger supporters of threat reduction activities within the Russian government. However, even with Minatom's active interest in this process, many problems persist. For instance, downsizing and scientific redirection activities are among the least successful active programs to date, although they remain in the security interests of the United States and a staple of rhetorical support for threat reduction. The overemphasis on commercialization as a major brain drain remedy, for example, has impeded creative thinking in this area and made it very difficult to gain acceptance of a comprehensive strategy for downsizing excess scientists and infrastructure that integrates basic science and science applied to real world problems, as well as commercialization and production.

Fissile material and warhead security activities continue with mixed results. The Material Protection, Control, and Accounting (MPC&A) program run by the U.S. Department of Energy is recognized as being very important and has made real progress in securing fissile materials and naval nuclear warheads. Since the end of 2001 it has received major influxes of U.S. financing and a new mission to secure radiological sources as well as fissile materials. Still only 40 to 50 percent of the fissile material work is completed, and there are persistent problems with access, transparency, and unequal partnership with the Russians. Questions remain about whether the security

improvements will be sustainable over the long term and how completed security upgrades will compare with international standards of nuclear material security. The warhead security program, run by the U.S. Department of Defense, is essentially fully funded, but the funds are backlogged because of the inability to expend them on the security upgrades. The key problems are access and transparency.

Fissile material reduction and disposition efforts are in limbo because of insufficient funding (in the case of plutonium disposition and research reactor conversion) and internal U.S. disputes (in the case of plutonium production reactor shutdown).

Biological Weapons Complex

Unlike the nuclear weapons complex, biological weapons are outlawed by treaty and there is no further weapons employment for the scientists (6,000–7,000). Here, the primary proliferation danger is brain drain, and some scientists are known to have already migrated to at least one country of proliferation concern. The obvious remedy for this situation is reemployment of the numerous scientists in nonweapons work. However, this goal is far from being met. Although there are some success stories, the strategy of focusing on commercialization as the primary re-employer has not worked well. The BW complex has limited commercial potential in its current state because of contamination and the need for high purity facilities for many commercial biological activities. The United States has increased its attention and resources to the needs of the BW complex during the past year and has shown great interest in the Russian collection of pathogens and potential Russian contributions to biodefense. But some of this emphasis is controversial. U.S. efforts are focused on a limited number of facilities, and the strategy for long-term success is unclear. Access and transparency issues have also blocked progress.

Another complication is that destroying infrastructure in the BW complex may increase brain drain threats. The destruction of the Stepnogorsk facility has led to acute unemployment for BW scientists in Kazakhstan. In addition, because of the numerous facilities that were constructed for BW work, each facility needs to be evaluated individually to determine the best way to neutralize the dangers presented by its research and production capabilities, its collection of pathogens, and its staff. Finally, many of the BW facilities have insufficient physical security and internal controls against the insider threat, and improving this situation is an urgent requirement.

One significant political problem is that there is no baseline understanding of the old Soviet BW complex and its full range of activities. Unlike the nuclear sector, this complex was and is controlled by multiple ministries and multiple countries. The United States has not yet been granted access to some of the BW facilities (those controlled by the Russian Ministry of Defense). This has left the United States with an incomplete understanding of the BW activities in Russia and an incomplete strategy

for threat reduction in this complex. The lack of a full understanding has raised severe suspicion of Russian activities and motives, particularly in the U.S. Department of Defense, which funds much of the threat reduction work in this area. For this process to move forward, these issues need to be addressed, but resolving them will not be easy.

Chemical Weapons Complex

The key proliferation dangers in the chemical weapons (CW) complex are the security of the existing weapons, brain drain, and the inability to destroy the existing stockpile. Some physical security improvements have been made, but they have not gone far enough, and many CW bunkers sit above ground vulnerable to attack. Although the destruction of the stockpile is an internationally agreed priority, funding and implementation have been major impediments.

The most immediate threat is that U.S. funding for the destruction of the weapons currently is blocked by legislation, although the Congress recently provided the President with the authority to waive the restrictions on CW destruction expenditures. Like the BW complex, chemical weapons have been outlawed by treaty, and there is congressional concern about Russia's compliance with this treaty. In addition, there is no weapons work for many of the excess scientists, and reemployment efforts have been weak. Even when conversion and redirection are approved (the Organization for the Prohibition of Chemical Weapons, or OPCW, is raising impediments to some CW facility conversion), success, particularly through commercialization, has proven to be limited.

Missile Complex

In the missile production sector, brain drain is considered to be a major proliferation threat. Some scientists have been reported to be assisting countries of proliferation concern. Comparatively little has been done to assist the transition of these scientists into other employment, and many moonlight at other jobs while remaining with their design bureaus.

The key technical proliferation challenge arises from tactical (ballistic and cruise) rather than strategic missiles. The reason is that many countries of proliferation concern have rudimentary missile programs and can benefit from low-tech, dual-use equipment and components that were made by former Soviet missile subcontractors. Contributing to this danger is that once Russian inter-continental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) are dismantled under the CTR program, their components remain uncontrolled and can be transferred.

Meeting Reports

February 19, 2002 Workshop

INTRODUCTION

Kenneth N. Luongo, *RANSAC Executive Director*

Ken Luongo began the meeting by asking participants to consider four issues as they relate to each part of the Russian WMD complex (nuclear, chemical, and biological weapons, and ballistic missiles):

- What is the scope of the proliferation-related problem? What is the proliferation threat posed by the facilities, their infrastructure, and their workforce?
- What activities have been undertaken to date to address the problem of the infrastructure and the workforce, as opposed to the more apparent efforts to improve facility and weapons stockpile security?
- What have been the challenges facing the efforts to redirect the workforce and the facilities, and how can these challenges be overcome?
- What—most importantly—are some new ideas for projects that could accelerate the transition process and meet the downsizing goals of these complexes?

Luongo urged that attendees consider possible new projects in the weapons complexes that could be implemented under a debt-swap arrangement. He encouraged all participants to propose new project ideas, offer new permutations for lost opportunities or projects that have fallen by the wayside, and suggest how successful components of current programs may be replicated in the other complexes.

THE RUSSIAN NUCLEAR WEAPONS COMPLEX

Review of Ongoing U.S. and Internationally Supported Downsizing and Conversion Efforts

Sharon Weiner, *Program on Science and Global Security, Princeton University*

Sharon Weiner reported that the national monthly wage stands at approximately $104 for the average Russian, while the average monthly salary for a scientist ranges from $150 to $160. It is believed that there are between 60,000 and 70,000 workers in the

nuclear cities. These numbers reflect all persons employed by the institutes, from the workers to the scientists to the senior administration.

There are several U.S. and international initiatives designed to help downsize and convert the nuclear complex. The largest program is the Moscow-based International Science and Technology Center (ISTC), which since 1994 has provided roughly $400 million to this effort. So far, $56 million has been allotted to the closed cities alone.

In 1997, the ISTC established the partners program, matching Western businesses with research projects developed under the ISTC in hopes of producing commercial ventures. To date, $4.4 million has been allocated for roughly twenty ISTC partner projects. Two projects have resulted in permanent job creation: Neural Networks and Global Electric, which last year took in $200,000 in revenue.

In 1994, the Department of Energy created the Initiatives for Proliferation Prevention (IPP) to fund and commercialize technology projects through the U.S. Industrial Coalition (USIC). The IPP program has allocated $27 million of its total $187 million to closed nuclear cities projects, of which 55 percent was spent in the closed cities.

In 1998 the U.S. Department of Energy created the Nuclear Cities Initiative (NCI) with an exclusive focus of downsizing the Russian nuclear complex, addressing the employment problems this downsizing would create, and developing new business infrastructure in three closed nuclear cities: Sarov, Snezhinsk, and Zheleznogorsk. NCI has received $46.5 million in funding to date. There had been a community development aspect of NCI aimed to upgrade cities' telecommunications infrastructure and institute business training programs, but these projects have since been cancelled.

Another closed-city actor, the European Bank for Reconstruction and Development (EBRD), has committed $3 million to the closed cities ($750,000 for 167 loans in Sarov; $660,000 for loans in Snezhinsk, and $1.2 million for 443 loans in Zheleznogorsk). The EBRD has also provided $1.3 million for 248 loans in Seversk. The U.S. Civilian Research and Development Foundation (CRDF) has provided travel and research grants to closed-city scientists totaling about $280,000.

The European Nuclear Cities Initiative (ENCI) is developing as Europe's main outlet for dealing with the nuclear cities issue. The ENCI concept is based on a demand-side approach to meet industry and market needs within Europe—and possibly even local Russian demands.

The Nuclear Threat Initiative (NTI) has recently approved a $1 million grant to the Sarov Conversion Fund to finance commercial ventures that will be undertaken in that city. To date no specific projects have been identified that will receive funding under the NTI grant. The Russian Ministry of Atomic Energy is also funding conversion work in the closed nuclear cities. Some private companies have invested in the nuclear cities independently: The companies Intel in Sarov; Isonics, Tatra, and BASF in

Zheleznogorsk; and Brisk in Ozersk have generated some $2 million in tax revenues for these cities within the past five years.

Challenges and Problems with IPP and NCI

Glen Levis, *U.S. General Accounting Office*

Glen Levis provided an overview of the two U.S. General Accounting Office (GAO) reports on the IPP and NCI programs. The GAO's role is to evaluate whether the programs are working, whether milestones are being met, and whether money is being spent effectively. GAO determined that both programs remain in the U.S. national security interests, but that high program costs and management issues continued to pose daunting challenges.

GAO's IPP investigation examined roughly 80 projects and evaluated their commercial potential. They found that many institutes were employing weapons scientists on a part-time basis. Despite its intended goal, GAO did not find a single IPP project to be a commercial success and found that the program had failed in providing sustainable employment through commercialization. GAO reported a lack of capital and lack of industry partners for conversion efforts. The program lacked clearly defined goals and objectives for the projects it supported. There was inadequate training of scientists in business skills and a limited market for proposed products. Despite the bad news, however, GAO also saw some interesting projects that were thought to have commercial potential, including those involving production of solar panels, acoustic fire fighting nozzles, and prosthetic foot devices, as well as a metals recycling project.

GAO found other problems in the IPP program. Nearly 67 percent of the funds were spent in the United States. GAO found that lab oversight varied from project to project, and in no cases did it require such a huge funding allotment. Additionally, there were dual-use implications of some projects, and chemical and biological projects were not being adequately reviewed.

GAO recommended that the U.S. Department of Energy do a better job evaluating the commercial potential of projects, that industry partners be in place for every approved project, and that projects without commercial potential be eliminated.

In its review of the NCI program, GAO encountered many of the same problems it had identified within the IPP program. As the program was just getting started at the time of the GAO review, the GAO recommended that the program not expand beyond the three pilot cities until the U.S. Department of Energy demonstrated that its efforts were meeting the program's stated objectives. They found that about half of the 26 projects were "community development" projects and did not result in new job creation, and there were complaints similar to the IPP review about the majority of the money being spent in the United States and not in Russia.

Also like IPP, there were projects that did appear to have commercial potential. Overall, however, GAO found that the cities were difficult to access, the environment was not particularly business-friendly, and the program selection process was not able to overcome these hindrances. GAO recommended that community development projects be eliminated and that U.S. Department of Energy management consider combining the NCI and IPP programs.

New or Under-Explored Opportunities for Accelerating the Conversion Process, Including Energy, Environment, and Nonproliferation Activities

J. Raphael Della Ratta, *RANSAC*

Raphael Della Ratta explained that RANSAC established the Russian Nuclear Complex Conversion Consortium in 2000 to increase governmental and NGO activities to address the needs of the Russian nuclear weapons complex and to generate new and creative projects that could be funded through either governmental or nongovernmental sources in areas such energy and environmental analysis and applied research, nonproliferation research and analysis, and commercial development that addresses identified market needs.

The consortium has developed the outline for a sustainable, cooperative strategy for conversion of the closed nuclear cities. This strategy seeks to establish the basis for long-term interaction with Russia and its weapons complex and scientists by seeking to apply the resident scientific capability in these complexes to "real world" international science, technology, and security problems and needs.

The strategy emphasizes scientific and technical cooperation focused on concrete issues; political and financial sustainability, with total transparency (this applies to Russian contributions as well those from the West); and approaches to cooperation that are based on the functional requirements, not specific programmatic activities.

The goals would be to meet identified needs and opportunities rather than revolve around the activities of individual programs as is the focus today.

The overall scope of the strategy is as follows:

- Continue the implementation of existing, concrete threat reduction activities;
- Fully fund basic scientific research activities in key areas;
- Ensure that commercial project development is based on market pull and requires that standards and product quality assurance are included in the front end;
- Identify and fund applied research and technology development opportunities and needs in energy technology and environmental management; and

- Identify and fully fund nonproliferation and other security analysis and technology development opportunities.

Della Ratta emphasized that past efforts have not focused on actual industry needs. An analysis of funded ISTC projects shows that ongoing work remains largely incompatible with the needs of industry as defined by the White House Office of Science and Technology Policy in its National Critical Technology list and subsequent reports. Roughly 40 percent of ISTC funding to closed nuclear cities projects supports nuclear energy research, an area not in demand by Western industry. Projects should pursue the development of applied research that can build on the basic research funded by ISTC. These applied research projects can also address real world problems (for example, in the energy and environmental sectors where Russian weapons scientists have knowledge and skills, and the West and Russia have technology development and analytical needs).

Della Ratta noted that if the U.S. political demands for commercial results are to be achieved, then government funding must be shifted to align better with the needs of industry and the market. This would require a different approach than that taken to date and would expand to include service-oriented enterprises made up of Russian scientists.

The European Nuclear Cities Initiative and the International Working Group

Maurizio Martellini, *Secretary General, Landau Network-Centro Volta*

Maurizio Martellini provided some additional information on the formation and activities of the ENCI. He explained that it has been very difficult to coordinate the activities of European countries and that the International Working Group was established to try and coordinate Europe's engagement with the closed nuclear cities. The goal of the ENCI is to use a "market-pull" model that identifies projects that meet clear industry demand and then involves Russian scientists in those projects. The ENCI has several tasks: Key among these is to involve the highest levels of the Russian and European governments in this issue. In addition, the ENCI program needs to identify two pilot projects that can be created in the closed cities of Sarov and Snezhinsk (the ENCI's two target cities) that can be managed like private companies and to incorporate principles of market demand, coordination, control, product certification, and development.

THE RUSSIAN MISSILE COMPLEX

Proliferation Potential of the Russian Missile Complex

Jon B. Wolfsthal, *Carnegie Endowment for International Peace*

Jon Wolfsthal argued that missile technology brain drain from Russia and the newly independent states (NIS) should receive greater attention because access to outside missile know-how has enabled emerging missile states to accelerate their own missile development programs. There is a clear concern about Russian supply of missile technology to countries of proliferation concern (CPC), particularly the Russia–Iran missile link. But just as these threats drive missile defenses, Wolfsthal argued that they should also drive threat reduction and brain drain programs.

Although materials are subject to strict export controls, brain drain is more difficult to control, as there are multiple conduits for information transfer. Wolfsthal cited the migration of Russian scientists as the real danger. There have been several surveys conducted on the missile complex workforce, but none has produced definitive information. Additional direct work needs to be done simply to assess the problem. Valentin Tikhonov's 2001 study for the Carnegie Endowment, *Russia's Nuclear and Missile Complex: The Human Factor in Proliferation,* examined the living situations and migration potential in three open missile complex cities: Miass, Votkinsk, and Korolev. The results of the study showed that employment is down, finances are shrinking, and the risk of migration is high. Salaries are extremely low, as is morale, which has increased the desire to work abroad, even in defense industries. An important point to note is that while the salaries are low, the gap between current levels and what is the desired level is not extreme.

An important component of the missile expertise proliferation issue is scientists moonlighting at second jobs. Notably, 77 to 91 percent of these workers cite economic reasons as the driving factor behind their taking on additional employment. This adds to the concern that these workers would relocate to CPC to ensure a steady, single income.

Challenges and Problems Facing the Process: Possible Conversion Opportunities for the Missile Complex Workforce, Including Space and Commercial Launch Activities

Steven Zaloga, *The Teal Group Corp.*

Steven Zaloga began by giving an overview of the history of Russia's strategic missile industry. During the Cold War until the early 1990s, the Soviet Union produced, on average, 240 ICBM and SLBM systems annually. Currently, the Russian-based sites

produce between six and ten. At the time of the collapse of the Soviet Union, the four missile design bureaus and the four production facilities operated separately; since the collapse, efforts to combine the two sides have met with mixed results. Table 1 outlines the sites that constituted the former Soviet Union's ICBM/SLBM design and manufacturing complex.

TABLE 1. ICBM/SLBM Design and Manufacturing Complex in the Former Soviet Union

Design Bureau	Production Site	Produced
NPO Mashinostroyenie	Krunichev	SS-11, SS-19
MIT	Votkinsk	SS-25, SS-27
Yuznoe MKB[a]	Dnepropetrovsk/Pavlograd	SS-17, SS-18, SS-24
Makeyev KB	Krasnoyarsk/Zlatoust	SS-N-20, SS-N-23

[a] This Ukrainian site was part of the Soviet Union's original ICBM/SLBM manufacturing program. But since the dissolution of the Soviet Union, it has been separated from the Russian Federation's program and is controlled by Ukraine.

Source: Steven Zaloga

The collapse of the industry has led to a corresponding collapse of the workforce. It is interesting to note that the U.S. industry has remained consistently small in comparison to what the Soviet ballistic missile industry once was.

Even at the height of Russia's ballistic missile manufacturing rate, Zaloga pointed out that 90 percent of the funding for missiles went not to the production sites but to the subcontractors that produced the missiles' various components.

The primary focus of the missile industry since the collapse of the Soviet Union has been on space launch services. Efforts have been made to turn the missiles into space boosters and work toward the advancement of Russia's space industry. However, the launch market is already saturated with an oversupply of boosters, and these former missile-derived boosters are not big enough to act as true space boosters, given their limited payload capacity.

Zaloga explained that the greatest missile complex threat comes from the spread of weapons know-how. More specifically, in the case of the Russian Federation, it comes from what Russians would consider tactical missile technology and expertise. He reported that nearly all of the missile fuel and guidance technology Russia currently employs or is developing far surpasses the capabilities of the CPC. Since all of the CPC still use liquid propulsion systems, this gives the international community a better idea

of the types of skills that are needed by the CPC and a better idea of who has them to offer in Russia.

THE RUSSIAN CHEMICAL WEAPONS COMPLEX

Review of Ongoing Efforts to Reduce and Redirect the Chemical Complex Workforce

Paul Walker, *Global Green USA*

Paul Walker provided an overview of the present situation in Russia's chemical weapons complex and ongoing efforts being conducted to assist Russia in the destruction of its 40,000-ton stockpile of chemical weapons. Russia's efforts to destroy its stockpile have faced several challenges over the years. Its first plan aimed to build a weapons destruction facility in Chapaevsk, which, though completed, was never opened due to public opposition. Russia's second plan was to build destruction facilities at each of the seven existing storage sites at a cost of more that $1 billion per facility. This plan is impossible for Russia to implement. The current plan is to build three facilities. One site, in Gorny, is being financed with $100–$150 million in European funding, with $12 million already pledged by the German government and $7 million by the Italian government.

The second site, at Schuch'ye, was designed and is being paid for by the United States. This site will destroy the 5,400 tons of nerve agent stored there, as well as the nerve agent currently stored at four other stockpile sites. A final site at Kambarka, based on the Gorny facility prototype design, will be built to destroy lewisite stored in bulk containers.

There are, however, many political conditions making these plans difficult to inplement. The U.S. Congress has placed a number of conditions on the release of U.S. funding for the Schuch'ye facility that have been difficult to fulfill. Further, the Russian government has been reluctant to comply with one of the U.S.-mandated conditions: full disclosure of the size of their chemical weapons stockpile. This makes it virtually impossible to identify correct funding estimates and plan for the type of facilities that will eventually be built.

Moreover, in Russia the issue as a whole remains a very low political priority especially in the Russian Duma. Russians do not believe that their existing chemical weapons stockpiles pose a threat to the nation. They believe them to be relatively clean and secure, and thus in the face of other threats viewed as more urgent, chemical weapons destruction receives little attention. The reality of the situation, however, is very different. All of Russia's chemical weapons are stored above ground and are therefore vulnerable to air-attack and theft. Some security upgrades have been put in

place at the Schuch'ye site following the events of September 11, but the site by and large remains vulnerable due to its low security and proximity to the Russian border.

Scale of Russian Chemical and Biological Weapons Complex Proliferation Risks

Amy Smithson, *Henry L. Stimson Center*

Amy Smithson offered suggestions on ways to help prevent proliferation from the former Soviet chemical weapons complex. There are currently over 60 research institutes scattered across the former Soviet Union, all of which are still brimming with intellect, skills, and weapons materials that initially enabled the Soviet Union to expand its chemical agent and germ warfare programs. It is more difficult now to find something constructive for these weapons scientists to do. There have been several programs initiated that pledge grant assistance for scientists, but these programs need to be improved and there needs to be more of them. In Smithson's view, of the tens of thousands of nuclear, chemical, and biological weapons scientists, a far smaller number possess the critical knowledge to make them a true proliferation risk. According to Smithson, there are approximately 2,000 critical nuclear scientists, 3,500 critical chemical weapons scientists, and 7,000 critical biological scientists. Therefore the scope of the brain drain problem is larger in the chemical and biological sectors.

Any effort to redirect these scientists into commercial ventures must include establishing Western regulations and quality standards. The successful transition of these scientists will depend largely on how well they can adapt to Western production methods and regulations. Product testing, regulations governing animal rights and testing, and manufacturing standards all need to become part of the Russian chemical redirection program.

There is a need to put more money into solving the problem itself, Smithson argued. The original U.S. contribution was very small, it did not reach the most risky scientists, and current funding for ISTC projects in the chemical sector remains very low. There is a need to understand the backgrounds of the scientists—what their individual specialties are and what level of expertise they attained. We should work with scientists to determine what offensive work they conducted for the Soviet programs in order to develop countermeasures and defenses against Soviet-developed chemical agents and, in the biological sector, pathogens. Safety at chemical weapons facilities is another large problem that needs to be addressed. The physical security of these sites is important to protect both the weapons and the scientists who manufacture them.

THE RUSSIAN BIOLOGICAL WEAPONS COMPLEX

Scale of the Russian Biological Weapons Complex Proliferation Risks

Milton Leitenberg, *Center for International and Security Studies, University of Maryland*

Milton Leitenberg provided a thorough history and current assessment of the Russian biological weapons complex. Russia's biological weapons program originated in the 1920s, expanded during World War II, continued through the 1972–1975 signing and ratification of the Biological Weapons and Toxins Convention, and was ultimately halted in 1993. According to Leitenberg, the United States and Soviet Union, prior to the BWC entry into force, conducted research and development on roughly the same ten to twelve pathogens, including anthrax, smallpox, tularemia, and plague. However, in the years after the BWC entered into force, the Soviet Union continued to conduct research into weaponizing various viro-hemorrhagic fevers, encephalitis, and antibiotic-resistant strains of anthrax, plague, and smallpox, among others.

There are believed to have been between 40 and 60 operating bioweapons facilities under Soviet control. Many sources, including Russian defector Ken Alibek, cite 60,000 as the number of people involved in this area of study, but Leitenberg cautioned that while there may have been 60,000 who worked in the labs in their various areas, there are only about a hundred scientists who understand the entirety of the bioweapons production process from start to finish. Even the most skilled lab workers were often isolated from the rest of the lab, he explained, and commissioned only to perform one task. Often they did not know what was going on in the workstation directly next to them. For this reason Leitenberg believes that while there are many people who pose a proliferation threat, this number is much less than popular estimates.

In terms of proliferation concerns, a few hundred scientists who have left Russia in pursuit of international employment have emigrated to Germany, the United States, and Israel, Leitenberg reported. There have also been a documented number who have gone to Iran. The Iranians are able to offer salaries to biological scientists that are comparable to U.S. levels, he said. There has been no substantiated evidence that Russian scientists have gone to either North Korea or Iraq.

A Case Study of Converting Biological Weapons Facilities: Vector in Novosibirsk, Russia, and Biomedpreperat in Stepnogorsk, Kazakhstan

Sonia Ben Ouagrham, *Monterey Institute of International Studies*

Sonia Ben Ouagrham presented a case study examining two biological weapons facilities. Vector, in Novosibirsk, Russia, is an applied research institute for viral

diseases. Most of its current activity revolves around assisting the United States in biodefense projects. Most of the biological agents developed at Vector are still there, as is the majority of the workforce. Biomedpreperat in Stepnogorsk, Kazakhstan, served as a large-scale anthrax production facility and is currently being dismantled under the U.S. Cooperative Threat Reduction program.

Of the two sites, Vector poses a greater proliferation threat with respect to pathogens theft and diversion, as it retains pathogen stockpiles. Biomedpreperat poses a less significant threat, as the entirety of its production capacity is being irreversibly dismantled, but there remains a small number of scientists—fewer than ten, Ben Ouagrham estimates—who know all of the steps of weapons production. Vector is in a stronger financial position than Biomedpreperat, as it continues to be supported by the state and conducts some commercial activities. Given its dismantlement, the Stepnogorsk facility has little to offer to its workforce, and the local economy has few employment opportunities to offer its workforce. For this reason, those in the Stepnogorsk workforce may be in a more desperate economic situation and more willing to sell their expertise to other states.

Using these two institutes as an example, Ben Ouagrham stressed that to understand bioweapons proliferation risks, each facility must be examined as its own unique case. Economic factors, location, and redirect missions must all be considered. Determining the accessibility of these experts, and the equipment and pathogens on hand, will contribute to the design of a nonproliferation policy that will address the threats as they exist. In some cases the upgrade of security systems and short-term redirection programs may be sufficient; in other cases, however, long-term conversion to nonweapons work may be required.

Ben Ouagrham cited several key factors that should be considered in such a site-by-site evaluation of proliferation risks:

- Facility assets and resources;
- Financial situation of the facility and its personnel;
- Willingness to undertake redirection efforts and nonweapons missions;
- Local economic and political environments, which can affect the facility's ability to take on new market-oriented missions; and
- Other regional or national characteristics, such as proximity to national borders, established drug trafficking routes, and local political stability.

Challenges and Problems Facing Biological Complex Conversion

James Wolfram, *Defense Threat Reduction Agency*

James Wolfram explained that there are challenges facing the Russian and FSU institutes involved in conversion activities and the U.S. government programs that fund and manage these efforts. In particular, access to Russian facilities remains a challenge; it is still unclear exactly how many institutes were involved in biological weapons activities, nor are the specific capabilities of institutes fully known. Wolfram noted that the Russian government cut their scientists off and did not give them a new mission, unlike the situation in the United States where scientists have been given a host of new mandates and updated missions.

Wolfram argued that it is too soon to be thinking of an exit strategy when the United States still has not managed to gain access to all of the Russian bioweapons sites. The primary goal currently is to try to understand how to make the research institutes function to fulfill their immediate needs. A major hindrance to this goal is that in the past these scientists have had no need for business skills or a sense of market factors.

In terms of program goals, in FY2001 the Defense Threat Reduction Agency (DTRA) sponsored visits for over 100 former Soviet bioweapons scientists to the United States to meet with U.S. officials and project sponsors. In addition, the U.S. Department of Defense placed U.S. scientists in Russian institutes to monitor project progress. The Defense Department's focus, Wolfram explained, is to focus on the scientists with experience working on disease-causing pathogens and to keep them working on bilateral projects. What is most needed is an employment strategy for these scientists, but such a strategy cannot be developed until there is complete transparency and access to facilities and scientists. The facilities themselves need improvement and security mechanisms installed. In terms of funding, Wolfram explained, between $14 and $17 million has been allocated over the past two years for thirteen cooperative biodefense research projects started in FY2001 and an additional eight to ten projects in FY2002, for coordinated training on animal testing and handling, and for the purchase of biosafety cabinets for storing pathogens and equipment.

June 27, 2002 Workshop

INTRODUCTION

Kenneth N. Luongo, *RANSAC Executive Director*

Ken Luongo began by explaining the intended goals and structure of the workshop, identifying eight issues to be addressed as they relate to each of the complexes:

- Do we fully understand the proliferation problems of each complex?
- Do the current programs adequately address the proliferation problems in each of these areas?
- What have the successes been and how can the international community build on these to further improve the situation?
- What gaps in the current programs need to be eliminated?
- Do the programs currently in place work as well as they could? If not, what can be done to increase their effectiveness?
- What new initiatives can be developed to address Russia's proliferation problems?
- What can be done to increase understanding of this agenda?

THE RUSSIAN NUCLEAR WEAPONS COMPLEX

Current Activities and Additional Steps Needed to Reduce the Threat

Anatoli Diakov, *Moscow Institute of Physics and Technology*

Anatoli Diakov opened with a general overview of Minatom's reorganization and conversion program of the nuclear weapons complex between 1998 and 2000. Although it is clear that there is room for increased efforts and improvement, it is also clear that the program has been successful so far. Minatom extended its 1997 conversion program through 2001, allocating approximately $252 million since its inception. Of the total allocation, $205 million has been spent, with funds divided between conversion and restructuring.

THE RUSSIAN CHEMICAL WEAPONS COMPLEX

Current Activities to Reduce the Threat

David Weekman, *U.S. Department of State*

David Weekman provided an overview of the size, scale, and general state of the Russian chemical weapons complex. Russia has declared 24 chemical weapons production facilities to the Organization for the Prohibition of Chemical Weapons. Of the 24, eight will or have been destroyed. To date, the CTR program has contributed approximately $20 million for dismantling chemical weapons production facilities at Novochebovarsk and Volgograd.

Weekman explained that the inspection process begins when the inspection teams examine the buildings and chemical infrastructure of the chemical compounds. Often the international community makes the mistake of assuming that an older facility is less of a proliferation concern than newer, converted facilities. Special care must be taken to ensure that converted facilities do not give way to greater proliferation threats because of the new, advanced technology included within.

Weekman laid out six recommendations to reduce the risk posed by Russia's chemical weapons facilities:

- Respond to Russia's conversion requests;
- Work with state parties and the OPCW to ensure that facilities are properly (and fully) declared;
- Ensure that facilities are converted in manner that coincides with the CWC;
- Focus on the conversion requests that are of the greatest proliferation concern;
- Maintain an adequate inspection rate; and
- Continue to strengthen efforts on the personnel front to help prevent brain drain.

Russia and the Chemical Weapons Convention

Alexander Pikayev, *Carnegie Moscow Center*

Alexander Pikayev provided an overview of Russia's position regarding the CWC. The CWC has been the most unpopular of all the arms treaties in Russia because of its huge cost—an estimated $6 billion over ten years. By the late 1990s it was evident that Russia lacked the money to implement its treaty obligations. Many felt that the only reason Russia agreed to the convention in the first place was because of an implicit (and unwritten) understanding that it would receive international financial assistance.

Russia will not meet the 2007 dismantlement deadline, and would not be able to, even if a request for a five-year extension until 2012 was granted.

With regard to the proliferation risk posed by the Russian chemical weapons complex, artillery shells filled with nerve agents present a great proliferation risk, although that risk is comparatively small compared to the risks presented by the other Russian WMD complexes.

As is the case with all of Russia's WMD complexes, the real proliferation risk posed by the chemical weapons complex is the threat of chemical weapons knowledge and expertise leaving Russia to countries of proliferation concern. Pikayev said he does not believe that the brain drain situation is hopeless, however. The chemical industry is one of Russia's major exporters, and he believes that the industry could absorb personnel and remaining facilities could successfully be converted. This contrasts with the nuclear complex, where there is no commercial opportunity to absorb expertise and the remote locations of many nuclear facilities make conversion difficult and impractical.

THE RUSSIAN MISSILE COMPLEX

Current Activities to Reduce the Threat

Steven Zaloga, *The Teal Group Corp.*

Steven Zaloga began the session with an overview of the Russian missile complex. Zaloga contends that strategic missiles themselves pose little proliferation risk and that it is the cruise and tactical missiles in addition to exported component technologies that will present future proliferation problems.

Russian strategic missiles pose a relatively minor proliferation threat. Russia has not exported strategic missiles since 1959, and there is no indication that this will change. The brain drain phenomenon is of minor proliferation concern with regard to strategic missiles. Many countries of concern would not benefit from help of former missile engineers, because current Russian missile technology is too advanced to be of use to their less mature programs. Although there is opportunity for underpaid Soviet missile engineers to pursue employment with other countries, Soviet compartmentalization minimizes proliferation concerns because engineers are so specialized that they may not be valuable to other countries. One possible strategic missile proliferation threat involves the risk of missile components being smuggled or exported. CTR only covers dismantlement, and thus Russia is free to put the parts "back on the shelf," so to speak. The SS-18 gyros that ended up in Iraq are an example of missile components being sold on the open market.

Tactical missile proliferation is of greater concern. Russia is adhering to the Missile Technology Control Regime (MTCR) despite industrial pressures. Systems such as the

"Iskander" have bred general concern that proliferation issues will begin to reappear. Such systems are problematic because most appear treaty compliant on paper. Although export versions are treaty compliant, the Russian army version is not and Zaloga indicated that with slight modifications, some treaty-compliant missiles could be easily upgraded to act as tactical weapons.

Cruise missiles also pose potential proliferation threats. Issues such as range and payload are difficult to determine and with modifications could risk violating MTCR compliance.

Space-related technology is a gray area with regard to proliferation. Because much of this technology is civilian based, it is difficult to monitor. Reentry vehicle technology is an area of particular concern, especially boosters and cryogenics. Attention must also be paid to convertible technologies, such as turbojet engines for small aircraft. This technology can be easily converted for use in cruise missile propulsion systems. The bottom line is that missile technology development is not a distinct field, but rather one that requires a broad base of talent from a number of technology sectors.

Additional Steps Needed to Reduce the Missile Proliferation Workforce

Victor Mizin, *Monterey Institute of International Studies*

Victor Mizin provided a brief overview of the Russian missile industry. The Russian missile complex under Boris Yeltsin comprised more than 1,700 facilities and two million people. Since 1992, consolidation within the missile industry has been dramatic. Design bureaus and production facilities that had been separate and independent operations are now merging into large conglomerates.

Mizin cautioned that the international community should not underestimate the potential threat of diversion, theft, or blackmail from impoverished Russian officers. Dissatisfaction among some scientific elites in Russia is intensified by the feeling that the present regime has betrayed them. Assisting states such as Iraq, Iran, North Korea, or Libya to obtain modern weaponry is easily rationalized in the minds of some technical specialists whose pay and elite status have been radically reduced.

The Russian missile/space industry is stymied by a lack of financial resources and investments. It is still dominated by the military and by Soviet-vintage ideology. Specialists remain underpaid. Many enterprises have lingered in chronic decay for the past ten years.

Privatization is the key, Mizin explained. The Russian government, however, currently seems to be more preoccupied with strengthening state control over the industry and in using the missile industry's meager resources for the military modernization campaign.

The main danger to international security posed by Russian WMD and delivery vehicle technologies lies in the potential proliferation of technologies, not materials. The process of restructuring and downsizing that the Russian missile industry is sufficiently turbulent to warrant concern. This process needs to be properly guided to reduce the risk of sensitive technologies or expertise falling into the wrong hands. In the current situation, the continued existence of the Russian nuclear arsenal presents far less danger than the possibility of Russian loss of control over that arsenal and associated technologies. The same applies to the considerable Russian nuclear delivery vehicle capabilities.

Mizin suggested that the approach to pursue with regard to the Russian missile complex should be one that identifies the root causes and motivations behind Russian missile/aerospace industries' interaction with states of concern and proposes a means to address them. It should attempt to ascertain to what extent such cooperation is driven by economic considerations rather than simply political decisions. It should also examine practical ways to discourage such forms of cooperation by creating long-term business relationships with U.S. firms.

THE RUSSIAN BIOLOGICAL WEAPONS COMPLEX

Background on the Russian Biological Weapons Complex

Jonathan Tucker, *Monterey Institute of International Studies*[1]

Jonathan Tucker illustrated how little information exists regarding the scale and activities of the Russian biological weapons complex. A major challenge is developing a comprehensive assessment of the program as it existed during the Soviet era, which can serve as a baseline for current threat reduction activities.

The Soviet biological weapons complex has always been highly decentralized with many different agencies contributing to various aspects of the program. The Ministry of Defense, Biopreparat (Ministry of Medicine and Micro Industries), Ministry of Agriculture, Ministry of Health, Academy of Sciences, Academy of Medical Sciences, Ministry of Chemical Industry, and the KGB have all participated in various aspects of Russia's biological weapons program.

There is no typical Russian biological weapons facility; there is no specific architecture for facilities, size of facilities, or number of employees. For example, Stepnogorsk—an anthrax production facility—has approximately 350 researchers on staff, more than did Bersk, which is a dedicated research and development site. In

[1] Dr. Tucker presented a paper prepared by Sonia Ben Ouagrham of the Monterey Institute of International Studies.

addition, all equipment is dual use. There is no clear distinction between research and production facilities. Some facilities supported the program but did not directly participate in bioweapons research or production. Due to the ambiguity of facilities' roles, there is no clear idea of what strains actually exist or where they are stored.

Tucker argued that proliferation assessments need to be done on a case-by-case, facility-by-facility basis. The biological complex resembles the missile complex in that only a limited number of people understand the full scope and the magnitude of the program. However, unlike the missile complex, the brain drain phenomenon is especially applicable to the biological complex and is cause for great proliferation concern.

Much more needs to be done with the biological complex. Many facilities have scarce security and loose accounting procedures in place. The CTR program has provided very limited assistance to only a handful of facilities. In addition, CTR assistance is usually geared toward preventing outsider threats rather than toward threats of diversion of pathogens from the inside.

There is an urgent need to develop a policy that operates simultaneously on the technical, financial, and educational fronts. This policy needs to be applied on a case-by-case or facility-by-facility basis. There is an immediate need for upgraded security at biological facilities and for additional education for employees at these facilities. Customs officials should be trained to detect biological weapons pathogens. More stringent export controls are needed. There is a definitive need for a system of international regulations and a better method to provide for the tracking of Russian biological weapons scientists.

July 24, 2002 Workshop

INTRODUCTION

Jon B. Wolfsthal, *Carnegie Endowment for International Peace*

Jon Wolfsthal opened the meeting arguing that not enough attention was being placed on the proliferation threat posed by the Russian biological weapons complex. In his view, neither the U.S. nonproliferation programs nor the international community were adequately focused on this threat.

THE RUSSIAN NUCLEAR WEAPONS COMPLEX

A Strategy for the Redirection of the Russian Nuclear Complex

J. Raphael Della Ratta, *RANSAC*

Raphael Della Ratta explained that there are several existing programs dealing with the Russian nuclear complex that are important and successful, including ISTC, NCI, IPP, and those sponsored and administered directly by Minatom and the Russian government. According to Minatom, between 15,000 and 30,000 jobs need to be created in the 2005–2007 time frame. Thus, in spite of the various programs to create new jobs, they often do not work together effectively.

According to Della Ratta's research, a total of $24.4 million has been financed for closed-city conversion projects. This includes the Russian government's contributions, the Sarov Conversion Fund, and U.S. Department of Energy contributions. For the roughly $24 million spent, only 2,000 jobs will be created. Considering that Sarov alone needs approximately 8,000 jobs, this number is far short of the target and is very low for the amount of money spent.

The ISTC has contributed $57 million to the nuclear cities for 444 different projects. There have been over 26,000 participants in ISTC projects, resulting in the generation of 7,000 full-time employment years. Forty percent of closed-city funding goes to funding physics and fission—sectors not in demand by Western industry.

Minatom has only produced half of the jobs it wanted to create a year ago, and none of the specific city projects are achieving their goals. The U.S. programs are only delivering a small percentage of the jobs needed.

A new multiple-approach strategic model is needed to meet the complex's redirection. To accelerate work, a cooperative effort should be launched to develop scientific and technical cooperation focused on real world problems driven by real market and technological needs.

The implementation of this strategic model would include continuing the existing U.S. Department of Defense and Department of Energy threat reduction activities already under way. Focus should be given to basic scientific research activities (ISTC, Technical Assistance for the Commonwealth of Independent States, or TACIS), and commercial project development should also be continued (NCI, IPP, ISTC partners). But there must be increased applied research and technology development based on identified technology and market needs.

A concrete example of a redirected employment opportunity is the creation of Russian consulting groups. This is an opportunity to maximize closed-city talent and create a scientific core that is more attractive to potential customers. Russian consulting groups could receive grants or compete for research contracts, transforming them into commercially viable entities thereby drawing them into the international community. Successful consulting firms in the West support themselves by conducting research for private firms and government agencies, work that would greatly contribute to the access and visibility of the Russian closed nuclear cities.

Other opportunities might include conversion laboratories that provide organization and management training for closed-city scientists. Scientists might also provide low-cost isotopes to the international medical community. Finally, retirement subsidies might also help in reducing the workforce.

Business Development of WMD Scientists and Facilities

William E. Hoehn, Jr., *Georgia Institute of Technology*

One of the first projects funded by the Nuclear Threat Initiative was for a study by the Georgia Institute of Technology on whether hi-tech business accelerators based in Russia could enhance employment opportunities for Russian WMD scientists.

Georgia Tech's Advanced Technology Development Center (ATDC), a business incubator, has been operational since 1981. By all accounts, it is one of the best and most successful in the country. The incubator has approximately 40 startups associated with it and enjoys a fair success rate of nearly 50 percent. In conjunction with the March 2001 Sam Nunn annual policy forum, 44 Russian scientists were brought to Atlanta, shown the incubator, and introduced to local businessmen. Due to this incubator's work and the existence of other business incubators in Russia, Senator Sam Nunn (D-GA) asked Hoehn to submit a proposal to NTI regarding the use of incubator centers to deal with the employment problems in Russia's weapons complexes. Under

the NTI project, Hoehn led an expletory group to various sites in Moscow to explore whether a similar incubator could be replicated in Russia.

Hoehn's group discovered that while Russia does have incubators in place within existing institutes, they function very differently than those in the United States. In Russia, many firms have no interest in leaving incubators or expanding their workforce. Modest but steady income, the prestige associated with the institute, physical security, and tax protection are all factors that encourage firms to remain at incubators for indefinite periods of time. In particular, many of the technology companies housed in institutes and run by weapons scientists are reluctant to give up the shelter the technology incubator provides. Further, many scientists are uninterested in expanding these companies, opting instead to let them function well enough to ensure a comfortable lifestyle that would not be affected by risk taking or company growth.

Hoehn and his group concluded that there were four major challenges facing any technology incubator established in Russia:

- Shortage of start-up capital;
- Lack of business management skills;
- Technology push instead of a drive to meet market needs; and
- Remote locations of closed nuclear cities, as well as the chemical and biological weapons facilities.

Hoehn's group also noticed that many of the chemical and biological facilities' equipment and buildings range from obsolete to extremely run down. The prospects for these sites are therefore less appealing than for the sites in the closed nuclear cities.

Hoehn's delegation made the following recommendations to NTI:

- Establish a demonstration program to test if a major project could work. Pick two sites for the trial demonstration—chemical and biological sites rather than nuclear sites, since federal support for these chemical and biological institutes has virtually disappeared.
- Pick a site in Moscow at an existing Russian "techno-park" to serve as a hub for training in Western business practices and interaction with potential customers, since Western entrepreneurs are seldom willing to travel to remote facilities.
- Because trust is essential in such a program, it would be essential to involve Russian entrepreneurs in the process of technology development and marketing. Hoehn's delegation believed that there are Russian entrepreneurs who could fill these roles, but they are different than Western entrepreneurs. In addition, numerous "technology raiders" from the West are especially active in buying up Russian technologies at low prices. Hoehn commented that his delegation was "tripping over" these raiders throughout their visit.

- Create two small funds to support this activity: a start-up fund to support the establishment of small companies inside the incubator, and a transition fund to assist companies when they are ready to move out of the incubator.

A Congressional Perspective on U.S.–Russia Nonproliferation Programs

Mary Alice Hayward, *U.S. Senate Armed Services Committee*

Mary Alice Hayward began by noting her affiliation with the U.S. Senate Armed Service Committee, which has budget authorization authority for U.S. Department of Energy nonproliferation and U.S. Department of Defense CTR programs, and that her remarks would focus on the debate surrounding the CTR certification waiver and the prospect of extending CTR to the states of the former Soviet Union and beyond.

The administration's recent decision not to certify the CTR program because of concerns about Russia's declarations and activities in the biological and chemical weapons arenas has caused the CTR program to cease its operations in Russia. Until certification is provided or President Bush signs a certification waiver, no new projects or contracts can begin and FY2002 and 2003 funds cannot be utilized.

The Nunn-Lugar law does not contain a provision allowing for the president to exempt recipient countries from the certification requirement. Bush's FY2002 emergency supplemental budget proposal to Congress contained a request for permanent authority to waive certification requirements for countries receiving Nunn-Lugar assistance, but the issue has been delayed by the congressional process. The Senate's version of the FY2003 National Defense Authorization Act (NDAA) contains the president's request to enable the president annually to waive the certification criteria for states receiving Nunn-Lugar support. Hayward explained that defense authorization bills are not generally completed until October for the next fiscal year authorization. The current U.S. House of Representatives defense authorization bill gives the president authority to exercise a waiver for three years, although there is a strong movement by some House members for Congress to grant one-year waiver authority and to revisit this issue each year. In practice, Nunn-Lugar dismantlement could be stopped for up to six to eight months each year, awaiting completion of the defense authorization bill containing the annual waiver authority, assuming that Russia could not meet the certification requirements for each year.

Hayward explained that there are threats outside of the former Soviet Union that could also benefit from the Nunn-Lugar efforts assuming there is cooperation of the recipient country. She noted two situations in which Nunn-Lugar funds could be realistically applied: responding to a proliferation emergency or facilitating long-term nonproliferation goals in other countries.

Under legislation sponsored by Senator Richard Lugar (R-IN), the Nunn-Lugar/CTR Expansion Act would authorize the secretary of defense to use up to $50 million of nonobligated funds for nonproliferation projects in states other than those of the former Soviet Union. Under the bill, the Department of Defense could ask Congress for permission to use some Nunn-Lugar funds for other countries if there are concerns about the security and safety of WMD materials. Congress would review requests and decide whether to approve projects. In an emergency situation in which there is a high possibility that weapons of mass destruction could be diverted or stolen, the secretary of defense could exercise his authority to decide to use nonobligated Nunn-Lugar funds for "emergency operations." The bill is also designed to make funding available from the nonobligated balances of several Nunn-Lugar projects rather than one particular area, so that extending threat reduction activities to other countries does not significantly hinder the individual Nunn-Lugar projects.

Also under Senator Lugar's proposed legislation, if the Department of Defense provides Nunn-Lugar assistance to a non-FSU country for two years in a row, then the Department of Defense and Congress could consider permanently expanding the program to that country.

Improving U.S.–Russian–EU Cooperation

Maurizio Martellini, *Secretary General, Landau Network-Centro Volta*

Maurizio Martellini provided participants with a brief overview of the current status of U.S–Russian–EU cooperation and made three recommendations for enhanced cooperation between the parties.

- Construct a roadmap for supporting and strengthening the activities of the Minatom Department of Conversion of the Atomic Industries (DCAI). Martellini pointed out that the best way to help Minatom identify and select the best conversion projects within the nuclear weapons complex is to create cooperation between the International Working Group (IWG) for the European Nuclear Cities Initiative and the DCAI of Minatom.
- Use the IWG–ENCI informal forums currently in place as a coordinating structure for identifying projects for the G-8 Global Partnership. Martellini explained that while the G-8 Global Partnership program may provide a political umbrella for many international cooperative programs working with the Russian nuclear weapons complex, it is necessary to expand projects and create a coordination mechanism between the different projects to avoid unnecessary overlap.
- Create a special envoy under the Russian presidency with a broad mandate to interact with all Russian entities (not only Minatom) involved in nonproliferation

and disarmament activities. This envoy is necessary because of the massive problems associated with downsizing, converting, and restructuring the Russian nuclear complex. Many problems Minatom faces in meeting its objectives are due to a lack of coordination among the many Russian ministerial entities, the Russian Duma, and the presidency.

THE RUSSIAN BIOLOGICAL WEAPONS COMPLEX

Accomplishments at Russian Bioweapons Facilities

Anne Harrington, *U.S. Department of State*

Anne Harrington began by explaining that this is a unique time for the Russian bioweapons industry because portions of the community are going bankrupt due in part to the enforcement of a Russian law requiring facility managers to either meet payroll deadlines or face criminal prosecution. This has created a large disruption in the system.

She explained that while this represents a good economic approach, it presents challenges from a nonproliferation standpoint. The current process of restructuring and downsizing the Russian bioweapons industry, with many individual enterprises struggling to survive, is sufficiently turbulent to warrant concern. This process needs to be properly guided to reduce the risk of dangerous pathogens or expertise falling into the wrong hands. Although some concerns have been raised that assistance programs intended to aid Russia in managing the transition of bioweapons research and development production facilities to civilian activity might subsidize Russian military modernization efforts, Russia will continue to have biological weapons expertise, technology, and pathogen collections that present less immediate danger than the possibility of Russian loss of control over this expertise, material, and associated technologies. Harrington stressed that it is in the interest of the United States and other countries to ensure that the process of realigning biological weapons facilities proceeds smoothly and that appropriate controls are in place.

The Department of State has embarked on a program to improve Russian facilities and make them more open, safe, and appealing to outside and foreign commercial investment. She noted that Russia's biological complex still suffers from Merck's poor assessment of Russian bioweapons facilities made in the early 1990s. Merck, which was looking for possible production sites, found the Russian facilities to be unsafe, poorly secured, and overall unsuitable for Western interaction. That notorious image endures today. But many opportunities remain for research partnerships, provided facilities overcome their utility costs, improve operating standards, and increase their efficiency. Harrington reported that there is an increasing willingness to restructure operations

and improve efficiency. This willingness represents a window of opportunity not seen before.

Harrington gave two examples of bioweapons facilities in Russia that have proven successful. NARVAC, at the Ivanovsky Institute of Virology, has converted part of its facilities into a company that develops and produces veterinary vaccines. She said that there was evidence of process and procedure adherence as well as adequate security mechanisms, and that the facility physically met Western standards. The second facility of note is the Institute of Highly Pure Biopreparations in St. Petersburg. It sells three of the drugs it manufactures on local markets, and the facility has been divided into half production, half research sections, allowing for continued growth and development. At both of these facilities, there is minimal Biopreparat or Academy of Science oversight, and they have independent decision-making authority.

The Russian military still presents the greatest area of bioweapons concern. The ambiguity surrounding the Russian biological weapons complex means that proliferation should be assessed on a case-by-case, facility-by-facility basis. Many facilities have scarce security in place and loose accounting procedures for pathogen collections. The United States has provided very limited assistance to only a handful of facilities. In addition, this assistance is usually geared toward preventing outsider threats rather than threats of diversion of pathogens from the inside. And when it comes to the military facilities, the United States has not been invited to visit Russian Ministry of Defense sites. Further, the Ministry of Defense cannot receive State Department funds, although there is increasing willingness to try to break through this barrier.

Decreasing the Danger Posed by Russian and FSU Bioweapons Institutes: Part I

Kathleen Vogel, *Cooperative Monitoring Center, Sandia National Laboratories*

Kathleen Vogel began her presentation by providing a brief overview of the current prospects and problems facing the Russian biological complex. In the past ten years, a greater appreciation for conversion has emerged, but there has been little discussion about actual conversion and how it ties into nonproliferation. Generally speaking, while many resources at biological facilities can be allocated for conversion, the most valuable resource is the unique collections of pathogens.

A large problem arises with the demilitarization of these facilities. For demilitarization to be complete, there must be certification that no offensive activities continue to exist. This is difficult to do because benign research activities are often very similar to offensive work, thus blurring the distinction between their activities. Transparency can help, but this becomes complicated with regard to the military

sites. Vogel argued that it is safer from a proliferation standpoint to close a facility than to attempt to convert it. For example, the dismantlement effort at Stepnogorsk, Kazakhstan, has been very successful, but from a conversion standpoint, it has proven a failure.

The issue of decontamination is also problematic with regard to biological weapons facility conversion. This problem is especially applicable to conversion and production of new items. Decontamination can be extremely costly, depending on the level of contamination and the proposed products to be produced in the converted facility. Products for human consumption require the most extensive decontamination. Other commercial items and those intended for animal consumption may require less stringent decontamination efforts but still represent an additional conversion cost.

Decreasing the Danger Posed by Russian and FSU Bioweapons Institutes: Part II

Sonia Ben Ouagrham, *Monterey Institute of International Studies*

Sonia Ben Ouagrham began her presentation by emphasizing that the conversion of former Soviet biological weapons facilities needs to take place on both technical and economic levels. On a technical level, conversion of BW facilities requires that resources be reallocated from defense to civilian activities. Conversion on an economic level requires a shift from operating as administrations in a command economy to operating as businesses in a market economy.

There are several significant obstacles that make BW conversion in Russia extremely difficult:

- Large dual-use facilities with high operating costs;
- Remote locations of many of these facilities (facilities located in city centers are better off with regard to conversion);
- Soviet emphasis on duplication of military facilities translates, in a conversion environment, into multiple competitors for the same market share;
- With the Soviet production structure gone, facilities have to reorganize their production networks independently;
- Transition to a market economy requires that converted facilities post profits and operate in a cost-effective manner; and
- Conversion is often implemented by former military officials with little or no business knowledge and without the help of outside contractors and state support.

There are also obstacles unique to biological weapons facilities outside of Russia that complicate conversion:

- High cost of utilities;
- Previous equipment cannot always be used for new activities; and
- No formally organized pharmacuetical system, which creates high product certification costs.

Successful conversion of former Soviet biological weapons facilities requires the following:

- Audit of the facility;
- Market research to determine the needs of the region and market presence;
- Business training;
- Seed investment;
- Marketing;
- Dismantlement and decontamination of facilities;
- Construction of new infrastructure; and
- Purchase of new equipment.

September 12, 2002 Workshop

IMPEDIMENTS TO PROGRESS

U.S. Political Support for Nonproliferation Programs

William E. Hoehn III, *RANSAC*

Bill Hoehn geared his discussion of political attitudes toward the Nunn-Lugar agenda during three time periods: 1991–1994, 1995–1998, and 1998 to present.

During the first phase, Hoehn described the creation of Nunn-Lugar—a congressional initiative with little support from the George H.W. Bush administration—as an "uneasy birth." Despite a strong negative reaction, particularly in the House of Representatives, to the original Aspin-Nunn proposal for providing demilitarization and emergency humanitarian assistance to the USSR, a modified Nunn-Lugar proposal more tightly focused on the destruction and safeguarding of weapons eventually received strong bipartisan Senate backing on its way to becoming law. During this phase, the Bush administration increased its support for the Nunn-Lugar programs as part of its effort to ensure that Russia would be the only Soviet successor state to possess nuclear weapons. Despite differences between the Senate and House on funding for threat reduction activities, Congress backed the broadening of Nunn-Lugar's mandate during this period, including authorization to begin work on preventing proliferation of nuclear materials and expertise and defense conversion. This expansion in the agenda was accompanied by congressional requests for reports on the implementation of threat reduction activities, as well as a multi-year plan for its future activities. Thus, by the end of 1994, Nunn-Lugar was on its way to becoming an institutionalized program, with a broader set of objectives than simply dismantling Russian strategic systems.

At the same time, to many policy makers, it was becoming difficult to distinguish Nunn-Lugar from other aid packages to the post-Soviet states that had been branded as wasteful. Nunn-Lugar was becoming entangled with the debates and issues relating to NIS assistance writ large, setting the stage for a difficult growing period in 1995–1998.

Hoehn described points during the second phase during which Nunn-Lugar encountered several near-death experiences, as a result of several killer amendments in the House of Representatives that would have placed severe constraints on threat reduction programs. Although all of these amendments were defeated, the republican revolution that swept through the House of Representatives following the 1994 elections did breed new antagonism toward the Nunn-Lugar agenda. The new

Republican leadership in the House viewed Nunn-Lugar as a policy priority for the Democrats and the White House, and threat reduction assistance was increasingly associated with other foreign aid that, to many detractors, appeared to go down ratholes. Coupled with concerns about Russia's renewed military assertiveness and its cooperation with Iran, these views among the House leadership created a difficult atmosphere for the Nunn-Lugar agenda.

Even so, determined lobbying and intervention by other moderate House members, supportive Senate offices, and Clinton administration officials fended off deep funding cuts and many of the more extreme measures to limit Nunn-Lugar programs. As a result, through this period congressional support for the core activities of Nunn-Lugar was retained, even while certain aspects of Nunn-Lugar cooperation—such as funding for military housing and environmental activities—were rejected. Moreover, Nunn-Lugar and U.S.–Russian nonproliferation programs were given the green light during this time frame to expand into new areas, including biological weapons security, chemical weapons destruction, and conversion of Russian plutonium production reactors.

Clearly, by the latter part of this phase, the Gingrich-effect was eroding. With the election of more moderate Republicans and "blue-dog" Democrats, debates over the existence of Nunn-Lugar were becoming a less central issue. To the extent there was scrutiny of this agenda, it was becoming more tightly focused on specific initiatives and the particulars of program management, implementation, and results.

Since 1999, congressional concerns regarding Nunn-Lugar have tended to focus more on the technical aspects and the rate of progress by specific programs, and less on the larger question of whether Nunn-Lugar, as a security concept, is viable. At the same time, the executive branch was adopting a more activist approach and expansive view of Nunn-Lugar, seeking to both accelerate existing programs and broaden into new areas. Following the Russian financial meltdown in August 1998, the Clinton administration responded positively with the Expanded Threat Reduction Initiative in 1999 to boost resources for Nunn-Lugar programs in the Defense, Energy, and State Departments. Congress embraced virtually the entire proposal, agreeing with the urgency of the mission and the need to sustain adequate budgets for WMD security work in the former Soviet Union for the foreseeable future.

However, while political support for the Defense Department's Cooperative Threat Reduction component of Nunn-Lugar stabilized during this period, congressional scrutiny of some major Energy Department–led nonproliferation efforts intensified, based on critical findings in several GAO studies. Some of these criticisms related to the metrics employed by Department of Energy programs to monitor their progress, the credibility of their strategic plans, and the amount of funding spent within the national lab system rather than activities on the ground in Russia. A Department of Energy proposal in 2000 to provide incentives to Russia to end spent fuel reprocessing

and to encourage joint work on proliferation-resistant fuel cycles was received with little enthusiasm by Congress.

Although the George W. Bush administration was initially reluctant to support U.S.–Russian nonproliferation activities, congressional pressure has kept it engaged in the process. Congress came to the rescue of Nunn-Lugar twice during 2001: reversing the $100 million in budget cuts proposed by the Bush administration and providing supplemental funding for major programs following September 11. Major programs currently remain well funded, although some smaller initiatives are in need of more support. Still, the Bush administration has illustrated that it is not prepared to unconditionally embrace the cooperative nonproliferation and threat reduction agenda. The administration's insistence to withhold CTR certification for Russia in 2002 because of concerns about Russian disclosures on its chemical and biological weapons activities, being a case in point.

Hoehn concluded his remarks with nine brief observations:

1. Congressional support, outside of the agenda's main backers, tends to be superficial because few members of Congress see the agenda as their signature issue, and few understand the complicated political and technical aspects of this work. While support for the general concept of Nunn-Lugar remains strong, there are few who are willing or able to put up a fight for the programs when criticisms or bad news about them breaks.

2. Senate backing for these programs tends to be stronger than in the House, where interest and attention to Nunn-Lugar is concentrated in a handful of members. In the Senate, on the other hand, supporters are spread out among a number of committees, with key advocates on the Senate Appropriations Committee.

3. Congress often attaches strings—in the form of reports, restrictions, and other conditions—to the programs and the funding, complicating the strategic planning by the agencies and inhibiting the pace of their efforts.

4. Tensions exist between congressional supporters of the program who would seek to expand Nunn-Lugar's mandate (including extending threat reduction to non-FSU states), and those who fear "mission creep" of this agenda from the original threat reduction mandate and a more limited set of objectives.

5. Some programs have often been asked to do too much with too little—the resources provided for some programs remain inconsistent with the magnitude of the challenges they are addressing. It is incumbent on virtually all programs to demonstrate that they can be models of good government accounting; in this drive for understanding where every nickel and dime goes under Nunn-Lugar programs, the urgency of this mission and the broader security objectives can be easily forgotten.

6. The U.S. GAO wields major influence in shaping the debate over Nunn-Lugar programs. A critical GAO study can have a negative impact on a threat reduction program for a year or longer, and the findings are rarely questioned by congressional members or staff. GAO reports have essentially become proxies for members to criticize Nunn-Lugar programs without having to personally denounce them.
7. Congress has emphasized and focused its support for the Nunn-Lugar programs on delivering tangible results and those that are working to "contain" proliferation risks—such dismantlement of strategic delivery systems, nuclear material storage security, and short-term anti–brain drain efforts—rather than the softer, less tangible aspects of this cooperative nonproliferation agenda—such as the fundamental downsizing and redirection of WMD complexes or warhead dismantlement.
8. A variety of expectations are placed on these programs. They are asked not only to achieve their nonproliferation goals in the shortest possible time but also to be model stewards of taxpayer funding, abide by often-complicated sets of conditions and limitations, submit numerous reports to the Congress, and serve as quasi-intelligence gathering efforts about Russia.
9. The history of Nunn-Lugar can be characterized by a number of role reversals between the executive and legislative branches: While Congress demonstrated primary leadership and initiative behind Nunn-Lugar in the early phases, by the late 1990s it was the White House that appeared to be taking a more activist and creative approach to the future of cooperative nonproliferation programs. Hoehn asked if it was fair to assume that the roles may be shifting once again, with the 107th Congress providing greater levels of political and financial support for this agenda than the administration and new congressional initiatives that would extend threat reduction models to new classes and types of threats.

Russian Political Support for Nonproliferation Programs

Alexander Pikayev, *Carnegie Moscow Center*

Alexander Pikayev discussed the functioning of Nunn-Lugar in the Russian government. Pikayev stressed that actors in Russia receive the assistance on an agency-to-agency and extrabudgetary level and that these amounts tend to be considerable relative to budgetary outlays from the Duma. He also reminded the attendees that within individual agencies, some elements are more interested than others. Certain sections of Minatom receive considerably more funding from the HEU deal and other

assistance than from annual Duma appropriations. As a result they tend to pursue their own foreign policy relative to the United States, sometimes at variance from the Russian government positions. However, other sections of the ministry have no interest in assistance. Within the Russian Ministry of Defense, institutional support for Nunn-Lugar is limited to the 12th and 15th Main Directorates. The Strategic Rocket Forces are also engaged in some Nunn-Lugar activities. On the diplomatic front, less than ten staff members of the Ministry of Foreign Affairs are engaged in threat reduction activities. This lack of involvement has created frequent obstacles to progress, especially where access and transparency have been concerned.

Biological and chemical weapons issues tend to be negotiated in their own frameworks. Four Russian agencies are involved in Nunn-Lugar BW activities: Ministry of Defense, Ministry of Health, Ministry of Agriculture, and Biopreparat. On chemical weapons, the Russian Munitions Agency, run by Zinoviy Pak, has been cooperative with the United States. However, as the Munitions Agency's budget from the Duma has grown, it has found itself less dependent on the United States for funding and is increasingly becoming disenchanted with U.S. funding restrictions.

A growing role has emerged for segments of the Russian government concerned with economic issues. This more economic-focused attention on nonproliferation was brought forward by the involvement of the president's economic advisors in the "10 plus 10 over 10" deal negotiated at the G-8 meeting. The role these actors play will be sustained only if the G-8 agreement is successfully implemented. The Ministry of Finance also seeks to play a role, but it has no control over externally provided assistance.

In conclusion, Pikayev noted that the vast majority of Russia's bureaucracies had no attention or interest in Nunn-Lugar activities. Although it lacks proponents, it also has no enemies seeking to undermine pursuit of the agenda.

Improving Access and Transparency at Russian Facilities: Case Studies of Successes and Failures

J. Raphael Della Ratta, *RANSAC*

Raphael Della Ratta outlined access and transparency issues in nine programs in the Russian Federation: (1) warhead transparency and storage, (2) launcher elimination, (3) plutonium production reactor conversion and shutdown, (4) the Mayak Fissile Material Storage Facility, (5) the HEU Purchase Agreement, (6) Minatom MPC&A, (7) Naval MPC&A, (8) the Nuclear Cities Initiative, and (9) warhead dismantlement.

These case studies presented details about the procedures for U.S. or designated inspectors to examine projects in Russia, such as the advance notice required by Russia, the number of inspections allowed per year, and the composition of the

inspection teams. Additionally, the case studies showed disagreements and factors that had hindered programs, while highlighting the motivations that made it possible for particular programs to advance and overcome access issues.

Della Ratta offered seven findings. The first was that access and transparency are critical to threat reduction efforts. Second, in many cases, differing objectives were present, resulting in divergent opinions on what kind of transparency was permissible. Third, as was visible in the HEU Purchase Agreement, significant and carefully targeted financial incentives can ease transparency and access for particular programs. Fourth, when a trusted third party is an intermediary between the United States and Russia for inspections, as is the case in the Naval MPC&A program, access and transparency are attainable. Fifth, when high-level attention is brought to program goals, real results are produced. Sixth, forcing access is not possible, and the threat of withholding assistance if access is not granted has been an unsuccessful strategy. Finally, U.S. approaches to attaining access tend to be uncoordinated, hindering overall attempts to produce transparency in the Russian nuclear weapons complex.

Issues Affecting Investment in Russian Weapons Institutes

Kenneth Rind, *Israel Infinity Venture Capital Fund*

Kenneth Rind spoke about the challenges of investing in enterprises formed by former Soviet weapons scientists. Many potential Russian businesspeople fail to understand that venture capital must involve the provision of assistance to the growth process and ultimate ownership of the company by the investors, in return for financing. Russians need to understand the negatives of their business climate.

The activities of the U.S. Civilian Research and Defense Foundation (CRDF) highlighted the challenges of leading Russia's weapons scientists into business. Of 10,000 proposals for scientific research, only 1,500 presented feasible projects. Of those 1,500 projects, only fifteen produced results worth introducing to U.S. businesses under CRDF's Next Steps to Market program. More often than not, the only output of former weapons scientists is scientific knowledge, not marketable products.

To resolve this problem, Rind suggested some optimism could be found in the experience of Israel. When venture capital first entered Israel in 1993, it also had quite a few risk factors that made investors averse to pursuing projects there, but it overcame them with very successful government programs. Additionally, the frequent business contributions of returned Israeli émigrés enabled changes in Israel's business culture. Both of these factors could be brought to bear in Russia.

To facilitate these changes, the U.S. and European governments need to encourage more private sector engagement by technology companies to set up laboratories in

Russia. Then steps to take include: targeting qualified small businesses for various tax breaks, other financial incentives, and various nonfinancial incentives, which would maximize the attractiveness of Russia as a location for investment.

Rind concluded by offering several lessons from his studies of technology commercialization. Educational infrastructure is necessary to promote the development of a business culture. Additionally, entrepreneurial experience had to be promoted by allowing people to both succeed and fail at getting rich. Finally, collaboration between universities and industries needs to be encouraged, as does foreign investment in research and development.

WHAT INCENTIVES CAN ACCELERATE COLLABORATION?

Russian Chemical Weapons Destruction: Overcoming Bureaucratic Impediments to Progress

Paul Walker, *Global Green USA Legacy Program Director*

Paul Walker provided a review of the Russian chemical weapons complex. From a proliferation standpoint, the CW sites at Schuch'ye and Kizner are the most worrisome, due to their proximity to Russia's border with Kazakhstan. The U.S. Congress has mandated that all Russian nerve agents be destroyed at one location, Schuch'ye, resulting in plans by all five nerve agent storage sites to ship agents there, rather than destroying them on-site. At Schuch'ye, the site has been prepared to receive shipments of nerve agents for destruction. Unfortunately, the transportation of these agents has created numerous problems and impeded the actual destruction process.

Congress has proposed $880 million for chemical weapons demilitarization in Russia. To date, the United States under CTR has spent around $300 million total. So far, $230 million has been obligated to destroy nerve agents at Schuch'ye, and approximately $20 million has been used for security upgrades at Kizner. Expenditures can be expected to jump significantly in the next couple years as the project progresses.

Walker reviewed the conditions placed on all CTR money. In addition to the six general CTR obligations, he noted that there are six additional chemical weapons–related requirements. For the Bush administration, the most problematic of the chemical conditions relates to Russia's past chemical weapons activities and whether Russia provided full and accurate disclosure about their chemical weapons stockpile. In particular, the administration believes that Russia possessed more than the 40,000 tons of chemical weapons that it declared prior to 1985.

On February 26, 2002, negotiations between the U.S. Department of State and the Russian Munitions Agency began regarding the Russian chemical weapons stockpile. The United States demanded full, unfettered access to sites with twenty-four-hour

notice. Russia agreed to most of the U.S. terms excepting a requirement of forty-eight-hour notice. The United States has rejected this offer, and now negotiations are in a state of paralysis.

Measuring Progress and the Effectiveness of Dismantlement, Destruction, and Downsizing Conversion

Elizabeth Turpen, *Henry L. Stimson Center*

Elizabeth Turpen set the context through which the implications and incentives for measuring progress in Russia's WMD complexes could be better understood. She believed that the threat of WMD terrorism today is more salient than the issue of arms control. This distinction is particularly important with regard to the nuclear weapons complex.

Turpen stated that of the various complexes, the nuclear complex baseline was best developed, while the baseline for the biological complex was poorly defined. This underdevelopment on the biological side did not bode well, as this area is potentially the greatest risk. In the past, the piecemeal approach of the United States had allowed the development of gaps in some areas and duplication in others. This approach also makes it difficult to prioritize different types of threats and make good decisions regarding allocation of resources.

The patchwork of programs is reflected in the U.S. government's lack of a single focal point and strategic vision. Efforts by the Congress to serve as the single strongest focal point of the U.S. strategic vision are limited and infrequent at best. Turpen also noted that legislation is a very blunt instrument to address these critical issues. Guidance for programs and progress to date could be characterized as "disjointed incrementalism." These programs need a focal point with leadership originating from the White House and the Kremlin.

Although the Nunn-Lugar-Domenici legislation of 1996 required establishment of a "nonproliferation czar," the Clinton administration refused to set up a single body to oversee arms destruction and proactive nonproliferation efforts in Russia and the former Soviet Union. In late 2000, proactive nonproliferation senators did not want to dictate to a new administration how to handle the nonproliferation malaise within its bureaucracies. A point person with oversight of the entire spectrum of challenges, needs, and estimated risks could provide a palette of options in overcoming challenges in access and transparency with Russia.

The Moscow Treaty and the accompanying Joint Declaration reflect that disarmament is less salient today than the threat of WMD terrorism. This new orientation has broad implications on the nuclear front. Both disarmament and nonproliferation objectives are generally served by ensuring some degree of

irreversibility. However, the disarmament path toward irreversibility is usually linear, whereas the proliferation risks along this same path vary. The fundamental priorities for U.S.–Russian cooperation in the coming years are to ensure at each step along this continuum that weapons are safe, whether deployed or stored, that materials are under adequate safeguards, and that scientists are busy and compensated. The Joint Declaration set forth these goals.

If the goal is no longer irreversibility but thwarting potential proliferation, then each of these options must be viewed through that new perspective. Also, dismantlement would appear to offer a concrete step along the disarmament path, but a different assessment is required for proliferation risks. If dismantling a warhead creates greater risk in terms of material diversion, then perhaps dismantlement is not progress.

Destruction can be measured and assumed to offer a quantifiable degree of progress. However, if the chemical weapons to be destroyed under the current U.S. CTR program represent only a specific, not entirely impressive, percentage of the Russian chemical weapons arsenal, then the case for a big expenditure of taxpayer dollars becomes extraordinarily difficult to make.

Downsizing is a goal that must be realized and should be a readily measurable effort. True downsizing of the physical complex can only happen through achieving viable economic opportunities for the scientists within the complex. Unfortunately, providing economic opportunities is the toughest political sell, and the track record of the program is not filled with successes, making the promotion of further activity in this area quite difficult. The United States has never done a good job at the human dimension of the proliferation threat. Sustainable economic opportunities to address the human proliferation factor cannot be created in a vacuum. The Departments of Defense and Energy are not conversion or commercialization specialists, and the U.S. government alone cannot and will not do an adequate job of addressing the WMD know-how threat. Incentives should be created to get private sector cooperation in facilitating U.S. nonproliferation objectives.

Alternatives to Facility Dismantlement: Are Commercial Enterprises and Technology Incubators the Answer?

Kenneth Dillon, *Spectrum Bioscience, Inc.*

Kenneth Dillon provided basic observations regarding commercial enterprise and specifically how those observations are applicable to the future of commercial enterprise in Russia. He stressed that there is a vital need to grow slowly and concentrate on the "easy things." It is important to be content with the small success stories. He also pointed out that taking a new technology from the brain to market is

very hard. Under the current circumstances in Russia, products are probably not the way to go. Efforts should be focused on supplying services, which are easier to develop and more successfully marketed. Within the nuclear cities, scientists would be doing a themselves a favor to concentrate on providing services.

On forms of business, it is important to identify what is the best approach to take before undertaking a business venture. In many cases a nonprofit is a good idea and fits well with the service industries. Dillon also stressed that it is important to have advisors from the onset of a business venture to help make critical decisions for that particular venture. He suggested that ways should be found to bring in Russian advisors or at least Russian-speaking advisors. Ten years ago it made sense to use American advisors, but copious Russian business talent now exists and must be utilized.

The problem of the closed nuclear cities and the chemical and biological institutes should be looked at in terms of segmenting the market. There is no magic approach to dealing with these problems. Different, innovative approaches are necessary. The ISTC is a good example of successfully managing 10 percent of the problem, and that 10 percent should be considered a success. However, in addition to ISTC, other approaches need to be applied simultaneously.

On the issue of intellectual property, simply too many patents have been issued, and it is too easy to invent around patents. In Russia, patents are usually a waste of time and money. At the same time, the issue of trademarking is a crucial piece of intellectual property that many Russians overlook.

Lastly, the idea of attracting Russian investors back to Russia is a clear winner. The closed cities are gated communities and therefore offer advantages similar to those of gated communities everywhere, including protection, relatively low crime rates, exclusivity, a growing population, and significant numbers of senior residents. Dillon believes that these gated communities offer different business opportunities, but it is necessary break into the sociology of these communities and exploit and address their needs. Russian gated communities can be better understood through the lens of "affinity groups."

Dillon then made several suggestions to accelerate cooperation with the closed nuclear cities, including: establishing credit unions, creating techno-parks, allowing lifestyle businesses to develop (as an alternative to high-tech business), and promoting the establishment of energy and environment research institutes.

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