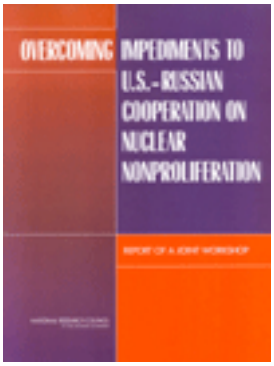

Overcoming Impediments to U.S-Russian Cooperation on Nuclear Non-Proliferation: Report of a Joint Workshop

U.S National Academies Committee on U.S-Russian Cooperation on Nuclear Non-Proliferation, Russian Academy of Sciences Committee on U.S-Russian Cooperation on Nuclear Non-Proliferation, Development, Security, and Cooperation, National Research Council

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REPORT OF A JOINT WORKSHOP

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Development, Security, and Cooperation

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PREFACE

Even during the Cold War, Russians and Americans recognized their shared interest in preventing the spread of nuclear-weapons capabilities. In the last decade, the United States and the Russian Federation have pursued cooperative nuclear nonproliferation programs, which focus primarily on securing nuclear materials and containing weapons and dual-use expertise and technology. This mission may be more important now than ever before.

People across the world realize that more and smaller groups, including terrorist organizations and non-state actors, can overcome the hurdles to obtaining nuclear weapons. The so-called "nuclear club," comprising nations that have nuclear weapons, has expanded, and weapons programs in other nations have threatened to expand the club further. The awesome destructive power of nuclear weapons makes this situation one of special concern.

For these reasons, the National Academies of the United States and the Russian Academy of Sciences are working together to improve U.S.-Russian cooperative efforts on nuclear nonproliferation. With funding from the Nuclear Threat Initiative, the Russian and U.S. committees listed in this report are developing and pursuing a variety of projects. The committees entrusted us with planning and guiding a workshop on overcoming impediments to U.S.-Russian cooperation on nuclear nonproliferation, and this report constitutes a record of that workshop. Despite the obvious importance of this topic, this report is actually one of the first attempts at a joint, systematic examination of problems and strategies to address those problems. We want to thank the Nuclear Threat Initiative for supporting the academies' work on this critical topic.

It is especially gratifying to work on important issues with people whom we like and respect. The Russian and U.S. government participants were thoughtful, candid, and generous with their time. Such constructive participation was essential to the workshop's success. Colleagues from our committees who participated in the workshop, Prof. Leonid Bolshov, Acad. Evgeny Avrorin, Prof. Frank von Hippel, and Prof. William Potter, contributed their insights, probing questions, and perspectives during and after the meeting, and the other members of the committees helped guide the project from its inception to the publication of this report. In addition, the dedication, efforts, and contributions of Dr. Chris Eldridge, Dr. Sergey Ruchkin, Dr. Micah D. Lowenthal, and Dr. Jo Husbands made the project possible. We are also grateful to Dr. Tariq Rauf, Ms. Elena Bergo, and their colleagues on the IAEA staff who helped us to arrange the Vienna workshop in a highly professional and collegial manner.

VADM Ashot Sarkisov (Soviet Navy, ret.)
MGen William F. Burns (U.S. Army, ret.)
Rose Gottemoeller

ACKNOWLEDGMENTS

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity and evidence. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

We wish to thank the following individuals for their review of this report: Sidney Drell, Stanford University; Doris Ellis, Sandia National Laboratories; Igor Khripunov, University of Georgia; Tariq Rauf, International Atomic Energy Agency; Vladimir Rybachenkov, Embassy of the Russian Federation; Clifford Singer, University of Illinois at Urbana-Champaign; and Yuri Volodin, Russian Federal Inspectorate for Nuclear and Radiation Safety (Gosatomnadzor).

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the content of the report, nor did they see the final draft before its release. The review of this report was overseen by R. Stephen Berry, University of Chicago, who was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

CONTENTS

SUMMARY OF WORKSHOP DISCUSSIONS

On September 22-23, 2003, the National Academies of the United States and the Russian Academy of Sciences held a workshop at the International Atomic Energy Agency to identify both impediments to U.S.-Russian cooperation on nuclear nonproliferation and strategies that these partners can use to address or overcome impediments (see Appendix A for the statement of task). The academies convened a group of independent experts and government officials from the Russian Federation and the United States (a list of participants can be found in Appendix B). Prior to the meeting, the workshop chairs circulated background papers (in Russian and English) based on discussions with the workshop participants and other current and former government officials working in this arena. These papers may be found in Appendixes D and E.

In this report, the joint committee has endeavored to capture the ideas and insights on these issues that were expressed during the workshop, consisting of the discussions and the background papers on which discussions were based. The joint committee has organized the information, ideas, concepts, and perspectives in a coherent fashion that is true to the ideas and opinions expressed in the workshop. The report describes the context of and motivations for U.S.-Russian cooperation on nuclear nonproliferation (Section 1); presents the histories and characteristics of programs that have patterns of success (Section 2); describes existing impediments to cooperation, with analysis of these impediments elicited from the workshop (Section 3); and presents options or strategies for addressing and mitigating impediments in the future (Section 4). Although no relevant topics were intentionally excluded from the discussion, no attempt was made to comprehensively cover all aspects of cooperation between the United States and Russia on nuclear nonproliferation. Meeting participants brought up issues they considered important within the specific context of the discussion, rather than trying to achieve an objective goal of completeness across the range of issues surrounding nuclear nonproliferation. By the same token, this report of the workshop discussions does not constitute an exhaustive survey of the topic.

In the interest of promoting candid discussions, the workshop was held with the understanding that comments would not receive individual attribution in the report. As a record of those discussions, the report includes opinions and recommendations from individuals and groups who attended the workshop.[1] The opinions expressed in this report, however, do not necessarily

[1] The Russian background paper presents preliminary results of studies conducted by the Russian committee members and invited experts, and reflects a consensus of the Russian team members. Because the Russian team comprised the majority of the Russian workshop participants, material drawn from the Russian background paper in

reflect the views of all workshop participants, the committee, the National Academies, or the Russian Academy of Sciences, or the official positions of the United States or Russian governments. The report does not contain consensus findings or recommendations from the workshop participants as a whole, or from the steering committee.

Despite positive and encouraging progress in U.S.-Russian cooperation on nuclear nonproliferation over the last decade, workshop participants observed that a variety of problems and impediments have emerged which significantly reduce the efficiency and effectiveness of joint efforts. Participants acknowledged the complex and interrelated character of emerging difficulties and impediments to cooperation, noting that no single remedy will be able to solve these problems. It nevertheless seemed possible and useful to describe the experiences and lessons of cooperation and to identify opportunities, strategies, tools, and resources that may be useful in overcoming impediments to cooperation.

THE INTERNATIONAL NUCLEAR NONPROLIFERATION REGIME

Containment and reduction of nuclear-weapons capability is crucially important to reduce threats to international security from nuclear conflicts, hostile actions by aggressor states, and nuclear terrorism or blackmail. The United States and Russia possess what are by far the world's largest nuclear arsenals, and they recognize the need to ensure their own national security and to maintain international stability through their bilateral cooperation on nuclear nonproliferation. Several workshop participants noted that this entails maintaining and strengthening the international nuclear nonproliferation regime as a component of the international collective security system. This regime, which depends heavily on the results of bilateral U.S.-Russian cooperation, comprises a set of legal, organizational, administrative, and technical measures directed to prevent the diversion or undeclared production of nuclear fissionable materials. The Treaty on the Non-proliferation of Nuclear Weapons (NPT) is a key element of this regime and places restrictions and obligations on all of the parties to the treaty. The threat of nuclear terrorism by non-state actors has become a critical concern as groups such as Aum Shin Rikyo, Al Qaeda, and others attempt to acquire nuclear weapons or weapons-usable material. Against both this threat and the spread of nuclear-weapons capability, participants noted, the United States' and Russia's interests coincide.

SCOPE, RESULTS, AND GOOD PRACTICES OF THE U.S.-RUSSIAN COOPERATION ON NUCLEAR NONPROLIFERATION AND RELATED AREAS

Workshop participants saw it as useful to examine programs that are generally regarded as having succeeded in overcoming impediments to cooperation. Background on these programs is presented in detail within the report but is condensed here for brevity. The key programs discussed are the Cooperative Threat Reduction Program (CTR); the Fissile Material Disposition Program's Highly Enriched Uranium (HEU) Purchase Agreement (also called Megatons to

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the following text can be considered to represent the views of the majority of Russian participants. At the workshop, this also resulted in many instances where there was a consensus among Russian participants.

Megawatts); the dismantlement of strategic ballistic missile submarines (SSBNs) under the Strategic Offensive Arms Elimination agreement (SOAE); the Materials Protection, Control, and Accounting (MPC&A) program funded by the U.S. Department of Energy; export control programs; the Joint Verification Experiments; the International Science and Technology Center (ISTC); and the International Nuclear Safety Program (INSP). Some workshop participants held up aspects of these programs as possible models for current and future projects. Some workshop participants argued that the features listed below are program strengths that should be emulated.

- The ability of the CTR agreement to expand and adapt in response to evolving circumstances. Supplementary agreements have been used to broaden CTR's role to include a wide range of bilateral interactions and to address implementation problems and resolve disputes between the two sides.
- The HEU Purchase Agreement is possibly the most successful U.S.-Russian effort in this arena, as costs are defrayed through commercial sales, and funds received by Russia are designated to upgrade the safety of the nuclear power plants, "convert nuclear cities," and conduct research and development on advanced nuclear reactors and fuel cycles.
- Dismantlement of decommissioned nuclear submarines is a high priority for Russia for several reasons, and United States assistance in elimination of strategic armaments by dismantling strategic ballistic missile submarines (SSBNs) has moved along well.
- The Materials Protection, Control, and Accounting (MPC&A) program, which is administered jointly by DOE and the Ministry of Atomic Energy of the Russian Federation (Minatom), has a long list of accomplishments to its credit, including developing MPC&A standards and regulations, building new, secure nuclear material storage facilities in Russia, and upgrading instrumentation, metrological, and methodological support for the control and accounting of nuclear materials.
- Bilateral cooperative export control programs are administered by several agencies to address a wide range of dual-use technologies. Under the aegis of the Russian interagency Export Control Commission, Minatom coordinates export control in the nuclear sector by involving representatives of all ministries with responsibilities in this sector to reduce bureaucratic impediments to cooperation.
- Scientists from the United States and U.S.S.R. conducted experiments, known as the Joint Verification Experiments,[2] in 1988 to assess their technical ability to verify compliance with the Treaty on the Limitation of Underground Nuclear Weapon Tests, also known as the Threshold Test Ban Treaty (TTBT). In the experiment, the two governments agreed that each would conduct an underground nuclear explosion, at their usual test sites, on a pre-agreed date. This enabled scientists from the two countries to carry out measurements of the explosions at their counterparts' test site. Impediments to this experiment were overcome because prior negotiations produced an inter-governmental agreement that resolved many issues, and high-level managers who headed both teams of experts were empowered to resolve urgent problems.
- The International Science and Technology Center's (ISTC's) success was attributed in part to the fact that key issues were formalized at the outset as an international agreement. These included requirements for project proposals, mechanisms for coordination with

[2] The Joint Verification Experiments were cited during the workshop as successful examples of cooperation between the United States and Russia. Their effectiveness in verifying compliance was not discussed.

Russian governmental bodies, project review procedures, audit issues and access to Russian institutions, exemption from taxes and customs duties, payment mechanisms, and operational support of ISTC projects by its Executive Directorate.

- The International Nuclear Safety Program (INSP), which was created to improve the safety of Soviet-built nuclear power reactors after the Chernobyl accident, was remarkable for its transparency and free access to financial and project information. This information was posted on the Internet along with progress reports.

IMPEDIMENTS AND THEIR CAUSES

Participants in the workshop also looked at programs that have not consistently succeeded in overcoming barriers to progress, observing a number of "weak points" and impediments hindering and, at times, even halting some programs. Barriers and impediments to cooperation take many forms, but the impediments identified within the workshop can be understood in terms of six kinds of issues: (1) political issues, (2) legal issues, (3) issues related to scientific and technical cooperation, (4) issues related to program organization and management, (5) issues related to the legacy of the Cold War mentality, and (6) funding issues.

Political Issues

As argued in the American background paper, to be effective a program must have both constancy and consistency despite operating within a sometimes turbulent political environment. Programs can be impeded, often unwittingly, when their timing makes them a political issue in one or both countries. The Russian background paper suggests that bilateral cooperative programs and their impediments be considered in terms of how they affect and reduce international proliferation risk, minimizing the effects of domestic political trends of the day in the United States and Russia.

Several workshop participants, from both countries, pointed to what they considered insufficient political will as a fundamental source of political impediments to cooperation. Decisions made at the highest levels can facilitate bilateral cooperation in general, and expressions of high-level support can enhance interactions at all levels of the governments and between the two societies more generally. However, a lack of political will, or the absence of strong, high-level political support for a program, can manifest itself in many ways. Some participants argued that the inconsistent positions of the governments in both countries have undermined programmatic efforts that build mutual confidence in the area of arms reduction.

Several types of impediments to cooperation related to political issues were discussed during the workshop.

Linkage of U.S. Funding for Cooperative Programs to Actions Outside of the Programs: Because the U.S.-Russian cooperative programs meet vital interests of both countries, linkage of their implementation to any extraneous political condition seemed counterproductive to some participants. But the United States sometimes links bilateral program activities to issues that do not fall directly under the purview of those programs. For example, cooperation on nuclear

energy technology has been hampered by U.S. insistence that Russia cease all work with Iran on the Bushehr reactor project.

Access Issues: U.S. officials need some access to Russian nuclear facilities receiving U.S. funds to monitor how the funds are used and what results are achieved. Yet, as both Russian and American participants suggested, Russian officials and site managers generally have been unwilling to grant open access to the sites, and sometimes impede access to the facilities where U.S.-funded work is taking place. Several Russian participants argued, however, that U.S. officials have at times sought more detailed data and more extensive access than appeared necessary to monitor use of funds. The lack of clarity regarding what information is really needed and what information is truly too sensitive to share has resulted in conflicts that undermine cooperation and delays that impede progress.

Visas: Several participants noted that obtaining entry visas for Russian nationals traveling to the United States has become more difficult as visa policies have tightened under the USA PATRIOT Act.[3] A number of participants stated that the current visa system interferes with both the specific and general goals of security collaboration with Russia and that it should be possible to meet the need for enhanced visa screening without imposing undue burdens on beneficial international collaborations, especially those that support national and international security.

Internal Interagency Difficulties: Both American and Russian participants described difficulties in their respective governmental interagency processes. Neither government is organized for maximum efficiency in implementing the cooperative nuclear nonproliferation programs.

Legal Issues

Specific legal impediments to U.S.-Russian cooperation on nuclear nonproliferation were highlighted in the Russian background paper.

Taxation: Several of the cooperative programs have an economic-aid component, wherein the U.S. government provides funds to support activities by ministries, groups, and individuals in Russia. By agreement, "donors" and "recipients" of these cooperative-program funds are tax exempt. The exemptions enhance the effectiveness of the funds, and avoid use of American assistance for activities other than the cooperative programs. The Russian team stated that some areas of collaboration have avoided serious complications, but a number of problems still remain to be addressed: (1) Lack of a clear tax exemption mechanism for participants in the scientific and technical assistance programs; (2) lengthy bureaucratic procedures for granting tax-exempt status because of the lack of capacity to review the numerous applications for small projects outside of large agreements; and (3) lack of a federal law exempting such projects from regional taxes.

Nuclear Liability: The original CTR agreement provided blanket liability protection for contractors, and the United States insists on including this provision in every new or renewed agreement. Russian participants stated that Russia is willing to implement a liability exemption

[3] The full title of the legislation is the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT) Act of 2001.

within the framework of international law, but is unwilling to continue providing blanket protection. Negotiations on this subject have virtually reached a deadlock, and some cooperative programs have not been renewed as a result.

Issues Related to Scientific and Technical Cooperation

International Promotion of Peaceful Uses of Nuclear Energy: Russian participants characterized the lack of U.S.-Russian cooperation on promoting the peaceful use of nuclear energy as an impediment to cooperation on nuclear nonproliferation more broadly.

Technical Feasibility of Proposals: Some U.S.-Russian agreements, such as the plutonium production reactor conversion agreement, have explicitly or implicitly required technical work that may not be scientifically feasible, as noted in the Russian background paper.

Issues Related to Program Organization and Management

The bureaucratic structures and processes created to implement cooperative programs can, unwittingly, impede the programs in many ways. If either the goals of a cooperative program or specific programmatic procedures are in tension or conflict with established bureaucratic approaches, progress may be delayed, operations may be halted, or funding may be put at risk. Such barriers and impediments can be seen by partners as evidence of a lack of commitment to cooperative efforts.

Personal Relationships and Managerial Flexibility: Program implementers must maintain a balance between the managerial flexibility made necessary by the different managerial and work cultures that prevail in each country and the structural consistency necessary for institutional stability as they work together to carry out projects. Several workshop participants noted that flexibility is attained in part based on personal contacts between program managers as they gain a better understanding of each other's problems and develop mutual trust and confidence.

Authority and Responsibility at Laboratories Implementing Programs: Some Russian participants observed that laboratories implementing cooperative programs express a desire to avoid excessive administrative or bureaucratic burdens, but seek support and authority from their ministries or departments when impediments arise, such as issues of access control or taxation.

Travel Authorizations and Other Bureaucratic Obstacles: Some American workshop participants observed that participants in cooperative programs often must obtain permission from several agencies within their own government to allow international travel. Similar to the process for travel authorization, concurrence requirements apply to approval for many other program activities, often resulting in long lead times to process paperwork for even minor actions.

Evaluation and Personnel Issues: American participants noted that at an organizational level, the United States lacks institutionalized mechanisms for evaluating and learning from experience to improve cooperative programs. With respect to personnel issues, turnover in U.S. personnel has resulted in instances where Russian partners have had to work with a different counterpart in the

same program nearly every year. Also, the United States and Russia have sometimes put personnel in positions for which they do not have the needed skills.

Issues Related to the Legacy of the Cold War Mentality

Several workshop participants noted that personal attitudes and relationships can be critically important, and residual Cold War thinking can undermine cooperative efforts. Despite our nations' non-adversarial relationship today, mistrust and suspicion often cause unnecessary tension during negotiations, delay or eliminate funding, and hinder efforts to establish effective arrangements. Cold War attitudes may also manifest themselves more subtly within cooperative programs, taking the form of explicit or implicit disrespect or mistrust.

Funding Issues

The United States provides nearly all of the funding for bilateral U.S.-Russian cooperative programs on nuclear nonproliferation, although Russia has pledged two billion of its own dollars for work in Russia under the G8 Global Partnership over the next 10 years. It often happens that appropriations laws in the United States are not passed by the beginning of the new fiscal year, and "continuing resolutions" allow the U.S. government and the programs it supports to continue to operate as though the previous year's appropriations continued to apply to the new period. This creates difficulties for programs in both countries. In addition, the Russian background paper argues that the funding of the majority of U.S.-Russian nuclear nonproliferation programs is not sufficiently transparent.

Preferences Given to Large Research Centers: Some Russian participants noted problems with the United States' preference for funding large research centers, to the neglect of smaller institutes, in the lab-to-lab cooperative programs.

Difficulties with Alternative Funding Mechanisms: Tax problems and the difficulties mentioned above make grants, such as those through the ISTC and Civilian Research and Development Foundation, more attractive for those applying for and receiving funding. But some Russian participants stated that getting approval for funding through these mechanisms is a time-consuming procedure. Further, if dual-purpose goods and technologies subject to export control must be procured, then the project gets caught between incompatible Russian export control laws and ISTC rules. Yet, dual-use projects are natural alternative research subjects for scientists who previously conducted research on weapons of mass destruction (WMD).

An American participant also noted that programs that do not produce readily measured evidence of threat reduction, such as the "brain drain" programs, sometimes face political disadvantages. The U.S. Congress, in this participant's view, more readily supports programs that provide visible proof of progress, such as weapons destruction programs. Many of these programs' successes, however, are not quantifiable, so that assessments of visible results may be unreliable as measures of progress.

TOOLS FOR OVERCOMING IMPEDIMENTS TO COOPERATION

Many workshop participants stated that the United States and Russia have found no single solution, no "silver bullet," to overcome impediments. Workshop participants, therefore, worked to identify tools and strategies for overcoming impediments, which are described in the following subsections.

A workshop participant also offered a list of characteristics that improve a program's chances for success: specific program goals, to which both sides agree at the outset; an agreed list of specific actions that will signal attainment of program goals; links between funding and the agreed goals and actions; and an agreed plan for transfer of project and funding responsibility from the United States to Russia. It was noted that, while these characteristics are necessary, they are not sufficient to guarantee program success, particularly for programs whose goals and progress are difficult to quantify.

Mechanisms for Interaction at Multiple Levels

Interactions Within the International Community: Based on the threat that nuclear proliferation poses to international security, some workshop participants argued that nuclear nonproliferation efforts are often most effectively addressed in the context of the international community. While acknowledging the difficulties of operating in a multinational environment, they said the benefits of multinational cooperation may be considerable once agreement is reached. In particular, shared responsibility can reduce project risks due to changes in bilateral relations and financial circumstances. The G8 and the NPT frameworks, with their affiliated regimes and agencies, provide many opportunities for strengthening the global nuclear nonproliferation regime through multilateral cooperation.

Government-to-Government Interactions: Many workshop participants pointed out that the support of high-level political leadership is important to the success of joint nuclear nonproliferation programs. Russian participants suggested that a cooperative program has a better chance of success if its major goals, subject scope, organization, and management issues are discussed and established in intergovernmental agreements, which enjoy high legal and political status in the two governments.

Joint Coordinating Committees: Both Russian and American participants noted that joint coordinating committees provide a high-level mechanism for making decisions and addressing problems. Because they meet on a regular basis, they can give an impetus to cooperative programs by imposing regular deadlines upon project managers. A joint committee with a high-level membership is also in a political position to lend support to program managers who need it to meet their short-term goals.

Agency-to-Agency Agreements: Workshop participants noted that agreements between implementing agencies of both countries are also vital to successful cooperation. With the CTR Agreement as the legal umbrella, DOE and Minatom have negotiated and signed their own implementing agreements to address the particular issues and concerns related to their specific programs, which was described as being especially important in overcoming impediments

because the agreements flow from the particular experiences and concerns accumulated in project implementation.

Manager-to-Manager Working Methods: Several workshop participants also suggested that project managers develop methods and procedures during the course of particular project work. It was suggested that a key to the success of manager-to-manager relations across programs has been the maintenance of small, consistent project teams.

Information-Sharing and Coordination: Workshop participants suggested that effective communication has been a challenge for cooperation on nuclear nonproliferation between the United States and Russia, but that some programs have devised mechanisms for encouraging effective communication. According to some Russian participants, INSP is a particular example of this.

Informal Discussion Meetings: Several participants in the meeting from both countries expressed a belief that informal meetings similar to the workshop would be useful in the future. They found it beneficial to have candid interactions with their counterparts outside of the protocols that govern official meetings, and without concern that their comments would later be used against them or their programs.

Exchanges of Personnel as Confidence-Building Measures: To overcome mistrust inherited from the Cold War, some workshop participants argued that one of the priorities of bilateral programs should be the education, training, and promotion of the next generation of specialists and managers. In particular, expanded and more balanced exchanges between the students of military and civil universities and colleges, groups of officers and scientists could contribute to the effectiveness of interactions and cooperation in solving nuclear nonproliferation issues.

International Development of Proliferation-Resistant Nuclear Energy Technologies

Most of the Russian participants emphasized heavily the potential role of cooperation on commercial nuclear energy in the international nuclear nonproliferation regime. In their view, attempting to restrict the access of non-nuclear weapon states to nuclear energy technology has achieved limited success. They suggested that, as an alternative, the United States and Russia should cooperate with the international community to embrace a more positive approach that facilitates the adoption of commercial nuclear energy in ways that strengthen rather than weaken the international nuclear nonproliferation regime. It was suggested that U.S.-Russian collaborative measures in peaceful uses of nuclear energy might simultaneously help overcome obstacles to bilateral cooperation on nuclear nonproliferation and bolster the international nuclear nonproliferation regime.

Changes in National Law, Policy, or Procedures

Pursuit of new laws can be difficult and time consuming, and so has not often been used to speed or ease implementation of the nuclear nonproliferation programs. In the U.S. case, legislative activity has been focused on providing authorization and appropriations for the programs. Some laws not specifically directed at the nuclear nonproliferation programs have had an enormous

impact on the programs, as in the case of changes in visa regulations that have flowed from the USA PATRIOT Act, mentioned previously. Implementing procedures, such as those for review of entry visas, or regulations can also be changed without changes in law.

The need for mechanisms to establish priorities within cooperative nuclear nonproliferation programs was expressed repeatedly during the workshop. It was argued that failures to establish agreed program priorities when programs were just beginning have increased the difficulty of completing the projects and resulted in misplaced efforts.

Participants noted that some have called for the appointment, in each government, of a single official who has direct links to the president and is responsible for facilitating interagency coordination of all cooperative nuclear nonproliferation activities.

Mechanisms for Disseminating the Benefits of Experience

Workshop participants suggested that a multi-program effort such as MPC&A will be most effective when the people involved in specific programs are aware of the situation in other programs and how their work relates to the overall effort. It was suggested that it is important to actively encourage and guide the development of institutional knowledge to increase the effectiveness of personnel and institutions. Similarly, there may be substantial benefit in establishing a unified program evaluation system that is transparent to program participants.

Other Tools or Fixes

Exemptions and Waivers: Some workshop participants argued that exemption and waiver systems could help address the types of bureaucratic roadblocks that are inevitable in a collaboration such as this one. The use of tools such as exemptions and waivers provides the opportunity to solve immediate problems without having to wait until their more fundamental causes have been addressed.

"Ad Hoc" Arrangements: Ad hoc arrangements in the early programs arose out of the necessity of getting work done despite the lack of agreements. As is argued in the American background paper, ad hoc arrangements have been useful to the programs historically, but have receded as the programs develop a system of agreements and procedures to underpin implementation; nevertheless, it was suggested that they must not be abandoned all together. At times, intervention from an individual willing to take responsibility might be necessary to accomplish an urgent project goal.

INTRODUCTION

The National Academies of the United States and the Russian Academy of Sciences held a workshop in Vienna, Austria on September 22-23, 2003. The purpose of the workshop was to identify both impediments to cooperation between the United States and Russia on nuclear nonproliferation and strategies that the two countries can use to address or overcome impediments (see Appendix A for the statement of task). The workshop participants comprised a group of independent experts and government officials from the Russian Federation and the United States. A list of participants can be found in Appendix B. Prior to the meeting, the chairs of the workshop circulated background papers, in Russian and English, which were based on discussions with the workshop participants and other current and former government officials working in this arena. These papers, which served as the basis for discussions, are included in Appendixes D and E. Material from the background papers that was not explicitly discussed during the workshop, but that informed the discussions, is noted in the text of this report. The International Atomic Energy Agency generously hosted the workshop.

This report describes the concepts and insights on these issues that were expressed during the workshop discussions and in the background papers on which discussions were based. The joint committee has organized the information, ideas, and perspectives that were articulated during the meeting into a logical structure. The report describes the context and goals of cooperation between the United States and Russia on nuclear nonproliferation (Section 1); describes the backgrounds and characteristics of programs that have patterns of success (Section 2); defines and analyzes existing impediments to cooperation (Section 3); and presents options or strategies for overcoming or reducing impediments in the future (Section 4). No pertinent issues were explicitly excluded from the workshop discussion, but no attempt was made to systematically cover all aspects of cooperation between the United States and Russia on nuclear nonproliferation. Instead, participants discussed topics that they felt relevant and important within the context of the discussion. Since the report reflects the workshop discussions, it does not constitute an exhaustive survey of these issues.

In the interest of promoting candor on the part of workshop participants, the workshop was held with the understanding that comments would not be attributed to individuals. As a record of the workshop discussion, the report includes opinions and recommendations expressed by individuals and groups who attended.[4] The opinions expressed in this report, however, do not

[4] The Russian background paper presents preliminary results of studies conducted by the Russian committee members and invited experts, and reflects a consensus of the Russian team members. Because the Russian team comprised the majority of the Russian workshop participants, material drawn from the Russian background paper in

necessarily reflect the views of all workshop participants, the committee, the National Academies, or the Russian Academy of Sciences. Nor do they represent the official positions of the United States or Russian governments. The report does not contain consensus findings or recommendations from the workshop participants as a whole, or of the steering committee.

Despite many positive and encouraging results in U.S.-Russian cooperation on nuclear nonproliferation over the last decade, a variety of problems and impediments have emerged which significantly reduce the efficiency and effectiveness of joint efforts. The causes of these impediments appear to be varied in nature, resulting from political, legal, technical, managerial, bureaucratic, structural, socio-historical, and other issues. The committee and the workshop participants acknowledged the complex and interrelated character of emerging difficulties and impediments to cooperation, noting that no single remedy will be able to solve these problems. It nevertheless seems quite possible and useful to describe the experiences and lessons of cooperation and to identify opportunities, strategies, tools, and resources that may be useful in overcoming impediments to cooperation.

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the following text can be considered to represent the views of the majority of Russian participants. At the workshop, this also resulted in many instances where there was a consensus among Russian participants.

THE INTERNATIONAL NUCLEAR NONPROLIFERATION REGIME

Nuclear weapons have enormous destructive power, which makes the containment of nuclear-weapons capability crucially important. Nuclear weapons normally serve as a deterrent against potential aggressors, in the form of a threat of terrible and inevitable reprisal against major attacks. At the same time, proliferation of nuclear weapons could destabilize existing balances of power, for example, or increase the possibility of accidental nuclear strikes. Further, countries with ambitions to expand their power could use the threat of nuclear attack for aggressive rather than defensive purposes. Finally, non-state actors, if they cannot be targeted by military forces and are therefore undeterred by threats of reprisal, could strike civilian population centers without warning, or attempt to extort concessions by threatening attack.

In discussing these issues, some workshop participants emphasized that the fundamental interests of the United States and Russia on nuclear nonproliferation coincide. The United States and Russia possess by far the largest nuclear arsenals and recognize fully the potential hazards of nuclear proliferation. In light of the need to ensure their own national security and maintain international stability, Russia and the United States seek to prevent nations and non-state groups from acquiring nuclear weapons or the means to make such weapons. They do this by reducing their own nuclear forces and through their bilateral cooperation on nuclear nonproliferation. Maintaining and strengthening the international nuclear nonproliferation regime is a component of the international collective security system. Further progress in this area depends to a large extent on the results of bilateral U.S.-Russian cooperation.

Cooperation between the United States and Russia on nuclear nonproliferation has a relatively long history extending back to the days of the Cold War. Cooperation among the United States, the Soviet Union, and many other nations facilitated the creation of the complex of international treaties which form the basis of today's nuclear nonproliferation regime. The regime comprises a set of legal, organizational, administrative, and technical measures. These measures are intended to prevent the diversion or undeclared production of nuclear fissionable materials, or undeclared use of technologies, by a non-nuclear state or non-state actors such as an international terrorist organization, for the purpose of acquiring nuclear weapons or other nuclear explosive devices.

The key elements of the international nuclear nonproliferation regime are as follows:[5]

[5] The United States and Russia cooperate increasingly through the IAEA on nuclear terrorism, orphaned sources, conversion of research reactor cores, and other matters, but these were not discussed at the workshop.

- The Treaty on the Non-proliferation of Nuclear Weapons (NPT). The NPT came into force in 1970 and in 1995 it was extended indefinitely. Now with 188 states party to the treaty, the NPT has become a nearly universal document.
- The nuclear safeguards system of the International Atomic Energy Agency (IAEA). This system is now being strengthened with the adoption of the Additional Protocol to the NPT by a number of NPT signatories.
- The nuclear export control system: the Nuclear Suppliers Group (London Club, 1975) and Zangger Committee (nuclear exporting countries, 1971).

The nonproliferation regime is enhanced by additional agreements, such as the International Convention on Physical Protection of Nuclear Materials During Their Use, Storage, and Transportation (1987) and several agreements creating regional nuclear weapon-free zones.

Under this regime, nations with nuclear capabilities are divided into three groups: nuclear-weapon states under the NPT (the United Kingdom, the United States, the Russian Federation, China, and France), non-nuclear weapon states who are parties to the NPT, and states that are known or believed to have nuclear weapons but are not party to the NPT (India, Pakistan, North Korea,[6] and Israel). The NPT has been described as a nuclear bargain between the parties: the non-nuclear-weapon states agree that they will not seek to acquire or develop nuclear weapons, and that all materials or technologies that could enable them to make nuclear weapons will be subject to international safeguards. In exchange, the nuclear weapon states must work in good faith toward nuclear disarmament and a treaty on general and complete disarmament; they must put in place export controls for the same materials and technologies; and they must cooperate in contributing to the further development of civil nuclear energy, especially in non-nuclear-weapon states.

Thus, the United States and Russia, the nuclear-weapon states that were the chief focus of the workshop, are under treaty obligations to ensure that both their external relations and their internal policies and programs support nuclear nonproliferation goals. Externally, when nuclear weapon states support efforts in non-nuclear weapon states to develop civil nuclear technology programs, weapon states are required to ensure that they do not inadvertently facilitate the development of nuclear weapons in the non-nuclear weapon states. Internally, weapon states must have domestic programs for export control and physical protection, control, and accounting for weapons-usable materials, relevant equipment, and technologies. Weapons expertise, too, must be contained within weapons states.

Although this workshop focused on the bilateral cooperative relationship between the United States and Russia, some participants noted several important multilateral efforts that are also under way. The NPT framework described above provides a number of multilateral opportunities to strengthen cooperation on nuclear nonproliferation. The G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction was also cited as being particularly important. This effort, which arose out of the June 2002 G8 summit in Kannanaskis, Canada, anticipates that G8 nations will spend a total of $20 billion over ten years to secure and destroy nuclear, chemical, and biological weapons and materials in the former Soviet Union.

[6] North Korea remains a challenge to the Nonproliferation regime because the nation was a non-nuclear weapons state operating under IAEA safeguards, but claims to have withdrawn from the NPT. Both the United States and Russia are interested in convincing North Korea to stop its nuclear weapons program.

The $10 billion that the United States expects to spend on the Cooperative Threat Reduction program will constitute half of this amount. Russia has committed to contribute $2 billion, and the other G8 nations will provide the balance of the funds.[7] It is hoped that insights gained from this workshop will contribute not only to bilateral cooperation between the United States and Russia but also to multilateral efforts such as the G8 Global Partnership.

The Russian background paper suggested factors which, at a general level, tend to encourage or enable a non-weapon state to seek to acquire a nuclear weapon. First among these was the need for national security. If the international collective security system embodied by the United Nations and international safeguards is effective in ensuring each nation's security against any potential aggressor, the reasoning was that this would reduce the number of nations that would consider seeking nuclear weapons. Deeper discussion of this topic was beyond the scope of this workshop.

The status of efforts by the nuclear-weapon states to fulfill their commitments under the international nuclear nonproliferation regime, including reductions of their nuclear arsenals, was indicated as a second reason why non-nuclear weapon states seek nuclear weapons. In the wake of the NPT, the fundamental obligations of the United States and Russia to reduce their nuclear arsenals were restated in the Strategic Arms Reduction Treaty (START I, 1991) and in the Strategic Offensive Reductions Treaty (SORT, ratified by the sides in 2003). Among the U.S. and Russian cooperative programs aimed at fulfilling these commitments, the following should be highlighted:

- Dilution of Russian highly-enriched uranium (HEU) into low-enriched uranium (LEU) and shipping it to the United States to fabricate fuel for commercial nuclear reactors (Russian-U.S. HEU Agreement of 1993, also called Megatons-to-Megawatts)
- Dismantlement of decommissioned Russian nuclear-powered submarines along with other strategic offensive weapons systems (the Strategic Offensive Arms Elimination agreement, SOAE, 1993)
- Shut-down of plutonium-production reactors in Russia (U.S.-Russian Plutonium Production Reactor Agreement of 1997)
- Disposition of surplus weapons-grade plutonium, which is no longer needed for defense purposes in the United States and Russia (agreements of 1998 and 2000)

Third, using current technologies for civil nuclear energy (including the nuclear power industry, research reactors, and propulsion reactor facilities for civilian surface vessels) involves nuclear-fuel-cycle steps that some participants characterized as potentially vulnerable (in varying degrees) to production and diversion of weapons-usable material. These steps are: uranium enrichment, nuclear-fuel fabrication, power generation, interim storage of spent nuclear fuel, reprocessing of spent fuel with extraction of power-grade (reactor-grade) plutonium, storage of extracted plutonium, and shipment of fresh or spent nuclear fuel.

[7] The Russian and U.S. governments believe Russia's $2 billion contribution should not be considered part of the $20 billion that the G8 nations agreed to provide. Source: Global Partnership Resource Page, http://cns.miis.edu/research/globpart/fnB34, accessed February 11, 2004.

This vulnerability was seen as having been addressed to a considerable extent by the IAEA international safeguards system and by a set of safeguards arrangements and activities at the national and regional levels. It was noted, however, that the growth of nuclear power worldwide, using current technologies, could strain the current safeguards system's limited resources, compromising their effectiveness by increasing the number of sites to be inspected and by facilitating the further proliferation of nuclear weapons. Such developments would require new approaches to prevent the spread of nuclear weapons, such as development and introduction of intrinsically proliferation-resistant nuclear energy technologies balanced with extrinsic measures (such as nuclear safeguards, etc.) to reduce the risk of indirect nuclear proliferation to an acceptable level.

Finally, the threat of nuclear terrorism by non-state actors has become a critical concern as groups such as Aum Shin Rikyo, Al Qaeda, and others attempt to acquire nuclear weapons or weapons-usable material (apparently unsuccessfully). Both the United States and Russia have been targeted by terrorists for major attacks; both have thwarted numerous attacks; and both have suffered losses of many civilian lives. Against this threat, too, the United States' and Russia's interests coincide.

SCOPE, RESULTS, AND GOOD PRACTICES OF THE U.S.-RUSSIAN COOPERATION ON NUCLEAR NONPROLIFERATION AND RELATED AREAS

Useful experience has been gained in U.S.-Russian cooperation on nuclear nonproliferation, and many specific, practical results have been obtained. Participants in the workshop saw it as useful to examine programs that are generally regarded as having succeeded in overcoming impediments to cooperation. Some elements of the organization, management, planning, implementation, and reporting of these programs may serve as models for current and future projects. Much of the information in this section is drawn from the background papers.

THE COOPERATIVE THREAT REDUCTION PROGRAM AND RELATED NONPROLIFERATION PPROGRAMS

The Cooperative Threat Reduction Program (CTR) was the first large-scale program for U.S.-Russian cooperation on nuclear nonproliferation, and became the basis for collaborative nonproliferation efforts on chemical and biological weapons as well. An umbrella agreement on the safe and secure transportation, storage, and destruction of weapons and the prevention of weapons proliferation, the agreement implementing CTR was signed by the presidents of the United States and Russia in June 1992 to provide a framework for accelerated implementation of the START I Treaty and to facilitate large-scale cooperation between the United States and Russia on nuclear nonproliferation. Also known as the Nunn-Lugar program (named for the U.S. senators who sponsored the legislation), the initiative focused on Russia and some other former Soviet republics.[8]

Over the course of more than 10 years, CTR has facilitated the efforts of the United States and Russia to address several challenging problems in nuclear nonproliferation, such as:

- Ensuring that nuclear weapons and components were shipped safely to Russia from the Ukraine, Belarus, and Kazakhstan
- Enhancing significantly the level of safety in storage of both nuclear weapons at Russian Federation Ministry of Defense facilities and spent nuclear fuel at the Russian Navy facilities

[8] The official name of the CTR umbrella agreement is the Agreement between the Russian Federation and the United States of America Concerning the Safe and Secure Transportation, Storage, and Destruction of Weapons and the Prevention of Weapons Proliferation.

- Modernizing the systems of nuclear material protection, control and accounting at more than 25 Russian nuclear facilities
- Building a storage facility in Chelyabinsk (Mayak) for surplus weapons-grade fissionable materials (due to open in 2004)
- Planning construction of fossil-fueled power plants to replace the plutonium-production reactors at Seversk and Zheleznogorsk (previously Tomsk-7 and Krasnoyarsk-26, respectively)

The ability of the CTR agreement to expand and adapt in response to evolving circumstances was suggested by some workshop participants as one of the program's strengths. Supplementary agreements have been used to broaden CTR's role to include a wide range of bilateral interactions, such as safety improvements in the construction of a storage facility for surplus weapons-grade fissionable materials. The agreement has also been adapted successfully to address implementation problems and resolve disputes between the two sides.

Fissile Material Disposition

The United States and Russia have agreements to work toward eliminating their stockpiles of weapons-grade plutonium and HEU, which were produced in their weapons programs during the Cold War. Their work to dismantle the weapons stockpiles, both within and outside agreements such as START, has only increased the size of these fissile materials stockpiles. These stockpiles were not only generally seen as a proliferation risk, but were also regarded by some participants as a threat because they would facilitate any efforts on either side to re-arm in violation of START, SORT, or other disarmament agreements.

The Russian-U.S. HEU Agreement, it was argued, is possibly the most successful U.S.-Russian effort to collaborate on fissile material disposition. This agreement, signed in 1993, provides for 500 metric tons of Russian HEU to be blended down into LEU over the course of 20 years. After it becomes LEU, the material is shipped to the United States, where it is fabricated into fuel for commercial reactors. It was expected that, by the end of 2003, more than 200 metric tons of HEU—enough for 8,000 nuclear warheads—would have been diluted, and 6,000 metric tons of LEU shipped to the United States. This is equivalent to approximately half of the U.S. demand for nuclear fuel and generated up to 10% of the annual electricity production in the United States. As compensation, Russia was to receive about $4 billion in revenues by the end of 2003, which are to be spent to upgrade the safety level of the nuclear power industry, "convert nuclear cities," and conduct research and development on advanced nuclear reactors and fuel cycles.[9]

Nuclear Submarine Dismantlement

One aspect of cooperation under the CTR umbrella is the dismantlement of Strategic Ballistic Missile Submarines (SSBNs) built by the Soviet Union. This program operates under the SOAE, signed in August 1993 to provide a mechanism for expediting arms elimination in accordance with START I. SOAE is a major component of the CTR program.

[9] The goals that over 200 metric tons of HEU would be diluted, 6,000 metric tons of LEU would be shipped to the United States, and $4 billion in revenues would be received by Russia were indeed met by the end of 2003.

The dismantlement of nuclear submarines is a large-scale political, engineering, and environmental problem involving a multitude of facilities and a large complex of interrelated technologies. Among engineering operations related to dismantlement, some participants noted that those dealing with unloading, storage, transportation, and reprocessing of spent nuclear fuel, i.e., those directly related to nuclear nonproliferation, are the most sophisticated and important. Financial considerations weigh particularly heavily in the submarine dismantlement program, because Russia cannot afford to either maintain the submarines safely at dock or dismantle them on its own at an acceptable rate.[10] A number of participants expressed concern that as the submarines rust and otherwise decay, they pose a growing environmental and safety risk, and that the significant amounts of HEU fuel involved pose a proliferation hazard.

The United States has purchased and installed specialized facilities and equipment for submarine dismantlement, such as an automated guillotine to cut submarine hulls into sections, cable reprocessing facilities, and a radioactive-waste-treatment complex. Russian participants pointed out that Russia increasingly wants to dismantle nuclear-powered attack submarines (SSNs) and cruise-missile carrying submarines (SSGNs), which are far more numerous than the SSBNs, and that Russia wants to add its own financial contributions to those made by other countries. Because the United States does not perceive its national security to be directly threatened by non-operational SSNs and SSGNs, however, the United States only provides funds for SSBN dismantlement. The resulting tension, it was further noted, has been mitigated by the fact that the United States permits Russia to use the equipment for SSN dismantlement at Russian expense.

Nuclear Material Protection, Control, and Accounting

Upgrading and improving the system of nuclear material protection, control, and accounting (MPC&A) became one of the largest and most important areas of the U.S.-Russian cooperation on nuclear nonproliferation because of its central role in protecting nuclear materials from theft or diversion. Most of these projects went forward under the aegis of DOE and Minatom. Such cooperation made it possible to:

- Construct new nuclear material storage facilities at Minatom enterprises and upgrade existing ones
- Develop MPC&A-related standards and regulations
- Develop a federal information system for nuclear material control and accounting
- Upgrade instrumentation, metrological, and methodological support of nuclear material control and accounting
- Improve radio communication for facilitating facility security
- Improve safety when shipping nuclear materials
- Institute departmental security training centers
- Equip Minatom enterprise security units
- Establish departmental supervision at Minatom enterprises

[10] A recent report of the Russian Federation Audit Chamber provides additional information on the financial management of the submarine dismantlement effort. It is available at http://www.bellona.no/en/international/russia/navy/31937.html, accessed 26 January 2004.

- Maintain operability of MPC&A-related systems and equipment
- Train Minatom's new protective force
- Promote a nuclear-security culture among Russia's nuclear site managers and employees

MPC&A cooperation between the United States and Russia has been in progress for about ten years and was characterized in the Russian background paper as highly efficient and as achieving appreciable practical results. The paper states that the security level of nuclear materials was improved considerably at more than 25 Minatom facilities involving tens of tons of nuclear materials (including fissionable weapons-grade materials). Among such facilities are the All-Russian Scientific Research Institute of Experimental Physics (VNIIEF, Sarov), the All-Russian Research Institute of Technical Physics (VNIITF, Snezhinsk), the Institute of Physics and Power Engineering (IPPE, Obninsk), and the Russian Research Center "Kurchatov Institute." in Moscow.

A long-term plan of joint activities at ten other Russian nuclear warhead facilities not managed by Minatom was also agreed upon. This project, intended to equip Russian Federation Ministry of Defense (MOD) facilities with up-to-date physical protection systems, obtained over 120 perimeter protection systems, 400 sets of computer equipment, devices to detect alcohol and drugs in human bodies, and a training complex for maintenance personnel. Although many Minatom and MOD facilities are participating or intend to do so, however, there are many Russian nuclear facilities that remain outside the MPC&A framework.

Transparent Dismantlement of Nuclear Weapons

Between 1996 and 1998, during preparation for the anticipated third iteration of the Strategic Arms Reduction Treaty (START III) and in compliance with the Joint Statement of the U.S. and Russian presidents (Helsinki, March 1997), multi-purpose studies were carried out at weapons laboratories in the United States and Russia. These studies focused on potential approaches, technological and organizational measures, and other techniques that could be used to ensure transparent dismantlement of nuclear weapons in the context of future arms reductions. Research work focused on several technical areas: radiation spectroscopy for materials identification, detection of explosives, elimination of nuclear weapons casings, and elimination of explosive components.

EXPORT CONTROL

DOE and Minatom also cooperate on export controls. There are many bilateral cooperative export control programs, and several agencies in both countries are involved with administering them. Export controls address a wide range of dual-use technologies both within and outside the nuclear sector. Some of them operate within ongoing bilateral cooperative programs, while in other cases, independent structures are created for specific export control regimes.

For example, two Minatom export control laboratories were established in 1997 at IPPE and VNIITF. These laboratories perform extensive research for Minatom, conduct training, develop

tools and methods for export control at Minatom enterprises, and review export contracts for identifying science-intensive export products.

Because of the political sensitivity of cooperation on export control, Minatom coordinates export control in the nuclear sector by involving representatives of all ministries that bear responsibility for the export control system in Russia. Some participants suggested that such an approach reduces bureaucratic impediments to cooperation. They also argued that the issues of export control and nuclear nonproliferation will continue to be one of the most important dimensions of the U.S.-Russian collaboration in the near future.

The nonproliferation regime also provides the United States and Russia with multiple multilateral opportunities for cooperation on export control. These include the Nuclear Suppliers Group, the Zangger Committee, and, to some extent, the Wassenaar Arrangement.

JOINT VERIFICATION EXPERIMENTS

Cooperation between Russian nuclear centers and U.S. national laboratories began in the late 1980s. Joint experiments on verification of compliance with the 1974 Treaty on the Limitation of Underground Nuclear Weapon Tests, also known as the Threshold Test Ban Treaty (TTBT), were the first major collaborations between Russian and U.S. government laboratories. Within the project framework, experts from the U.S.S.R. carried out measurements of underground nuclear explosions at the Nevada Test Site (August 17, 1988), while American scientists performed measurements at the Semipalatinsk test site (September 14, 1988). Participants who raised this example of early cooperation stressed that, when implementing this project, both sides had to overcome many objective and subjective impediments. These included the need to protect sensitive information concerning fundamental national security issues, mutual mistrust and suspicion, differing technical approaches to nuclear testing and measurement, access control issues related to the arrival of large groups of technical experts from the other side, and examination of sophisticated equipment for planted intelligence devices.

Negotiations in Geneva that produced an inter-governmental agreement helped the parties overcome these impediments. High-level managers who headed the teams of both the U.S. and the U.S.S.R. experts were empowered to resolve urgent problems. Because of the positive nature of these interactions, and the useful data they produced, some participants in the workshop stated that the joint verification experiments were a major step toward strengthening confidence between Russia and the United States.

INTERNATIONAL SCIENCE AND TECHNOLOGY CENTER

The idea of establishing the International Science and Technology Center (ISTC) emerged in the course of a visit by U.S. Secretary of State Baker to VNIITF in the early 1990s. The major purpose of the ISTC is to motivate Russian weapon scientists and experts to pursue peaceful science projects in Russia, thereby preventing the scientists from leaving Russia and contributing to illegal nuclear weapons development programs in other countries. ISTC became the source of

significant support for such scientists during the hardest years of restructuring the Russian economy.

In the last 10 years, ISTC funded about $500 million in research involving over 51,000 scientists from 700 research institutes in Russia, Byelorussia, Armenia, Georgia, Kazakhstan, and Kyrgyzstan. Several Russian participants attributed ISTC's success in part to the fact that the following key issues were agreed at the preliminary stage and formalized as an international agreement:

- Requirements for project proposals and format of their presentation
- Mechanism of coordination with Russian governmental bodies
- Project review procedure: project proposals receive expert appraisals by a Scientific Advisory Board, then decisions are made by the funding parties at the ISTC Board of Governors meetings
- Issues of audit and access to Russian institutions for evaluation
- Reimbursement of (exemption from) taxes and customs duties
- Payment of project grants for their participants
- Operational support of ISTC projects by its Executive Directorate

In addition to ISTC, it is important to note two other programs that work to reduce the likelihood that Russian weapons expertise will leave Russia. The Initiatives for Proliferation Prevention and the Nuclear Cities Initiative are run by the U.S. Department of Energy and have different approaches than ISTC. Initiatives for Proliferation Prevention focuses on the involvement and investment of private industry in the weapons complex of the former Soviet Union. The Nuclear Cities Initiative, which operates within the previously secret "nuclear cities," emphasizes the transformation of the Soviet weapons complex infrastructure to commercial use.

INTERNATIONAL NUCLEAR SAFETY PROGRAM

The International Nuclear Safety Program (INSP), though not focused directly on nuclear nonproliferation, is related to this subject. Some Russian workshop participants held up the program as a good example of U.S.-Russian cooperation, saying that the experience gained applies to other areas of cooperation, and that the program was remarkable for its transparency and free access to financial and project information. The INSP program was initiated shortly after the Chernobyl accident and was directed to assist Russia and other countries with Soviet-built nuclear power reactors to improve the safety of their operating plants. The work of the program has now largely been completed.

Information on the progress of program implementation within specific areas of safety improvement initially could be obtained from quarterly and annual reports compiled by DOE. Later, as the number of joint projects increased, the reports were organized by subject and made available on the world wide web, along with detailed project descriptions, staff contact information, and financial data. Regular progress reports were also posted on the Internet and distributed to relevant Russian organizations, including power-plant operators. The Russian background paper emphasized that this high level of transparency and communication, and routine meetings among managers of individual INSP projects from both countries, were among the program's strengths.

IMPEDIMENTS AND THEIR CAUSES

In trying to develop strategies for overcoming impediments to cooperation, participants in the workshop not only examined successes, but also looked at programs that have not consistently succeeded in overcoming barriers to progress. Along with the positive results described in Section 2, the decade of experience with U.S.-Russian cooperation on nuclear nonproliferation has revealed a number of "weak points" and impediments which have hindered and at times even halted some programs.

Many workshop participants saw identifying and understanding the source of an impediment to cooperation as essential to overcoming that impediment. Barriers and impediments to cooperation take many forms, but the impediments identified within the workshop can be understood in terms of six kinds of issues: (1) political issues, (2) legal issues, (3) issues related to scientific and technical cooperation, (4) issues related to program organization and management, (5) issues related to the legacy of the Cold War mentality, and (6) funding issues.

POLITICAL ISSUES

Cooperation between nations on nuclear security involves acts of governance and diplomacy, which are by nature political. The political context is simply a fact that must be recognized in assessing impediments to progress on controlling nuclear proliferation. Indeed, were such efforts not political, they would be immune and unresponsive to each nation's interests.

As argued in the American background paper, to be effective a program must have both constancy and consistency despite operating within a sometimes turbulent political environment. Programs can be impeded, often unwittingly, when their schedules make them a political issue in one or both countries. The Russian background paper suggests that bilateral cooperative programs and their impediments be considered in terms of how they affect and reduce international proliferation risk, minimizing the effects of domestic political trends of the day in the United States and Russia.

Several workshop participants, from both countries, pointed to what they considered insufficient political will as a fundamental source of political impediments to cooperation. Decisions made at the highest levels can facilitate bilateral cooperation in general, and expressions of high-level support can enhance interactions at all levels of the governments and between the two societies more generally. However, insufficient political will, or the absence of strong, high-level political support for a program, can manifest itself in many ways. Some participants argued that the lack

of consistency with which both governments approach cooperation on nuclear nonproliferation has undermined programmatic efforts that build mutual confidence in the area of arms reduction. As a specific example, some Russian participants noted that changes in the work strategy of every new U.S. administration, and the subsequent reshuffling of the U.S. program management, is problematic for cooperative programs.

The following subsections more specifically address higher-level political issues that were part of the workshop.

Linkage of U.S. Funding for Cooperative Programs to Actions Outside of the Programs

The Russian background paper suggested that an ultimate objective of the international nuclear nonproliferation regime is to prevent nuclear weapons from spreading in the world. Therefore, according to the paper, the bilateral U.S.-Russian cooperative programs on nuclear nonproliferation, and impediments to them, should be considered in terms of this international context, i.e., how they affect and reduce the proliferation risk. Bilateral programs with such objectives meet the interests of both sides, and are therefore least subject to changing political goals of current administrations. Insulation from these shifting political goals is a necessary, but not sufficient, prerequisite for program success.

Although such insulation would clearly bring some benefits to cooperative nonproliferation programs, the realities of cooperation are sometimes different. Provisions of both overarching legislation and individual appropriations bills in the United States sometimes link cooperative programs to requirements for action by Russia. Some American participants suggested that, while such legal provisions are sometimes regrettable, these linkages are generally unavoidable within the U.S. political system. For example, in the case of destruction of chemical weapons under the CTR program, funding could only be provided if the president of the United States certified Russia's compliance with chemical and biological arms control accords. The requirement for annual recertification was modified in 2002, allowing waivers of the requirement at the president's discretion until 2006, except for demilitarization of the Schuch'ye site, which continues to need annual recertification. In 2002, before the U.S. Congress granted the president the authority to waive recertification, funding was held up for several months.

A whole array of restrictions, including funding restrictions, applies to U.S. interactions with parties that are believed to be assisting Iran in any of several ways. The Iran-Libya Sanctions Act of 1996, and several executive orders imposing these restrictions, which are part of a broader U.S. policy regarding Iran, are examples of U.S. actions that pressure Russia to freeze its collaboration with Iran in the area of nuclear energy. According to the Russian background paper, the U.S. intelligence community assesses that Iran is seeking to develop and acquire nuclear, chemical, and biological weapons and the means to deliver them, and that Iran hopes to exploit access to the Russian nuclear establishment to promote the Iranian weapons program.

Russia considers the United States' concerns unjustified, stating that under the economic, scientific and engineering cooperation program whereby Russia assists Iran in completing and starting up the nuclear power plant in Bushehr, both Russia and Iran fulfill their international nuclear nonproliferation obligations. The Russian government views cooperation with Iran as an

ordinary and legitimate commercial venture in civil nuclear energy that is in Russia's national economic interests.[11]

Some participants noted that from the United States perspective, both isolation of Iran and promotion of U.S.-Russian cooperative programs on nuclear disarmament and nonproliferation are in the national security interests of the United States and Russia. Where these interests conflict, one may override the other. From the Russian perspective, promoting the peaceful use of nuclear energy is a component of a healthy international nuclear nonproliferation regime: if the nations that have advanced nuclear energy programs supply nations that have little nuclear energy capability with nuclear power plants and supporting facilities, the nations with indigenous nuclear energy programs can control the kinds of technologies deployed and build nonproliferation requirements into the contracts, effectively raising the relative cost of proliferation. Thus, if agreed international standards are met, there should be no quarrel.

It was observed that some Americans mistrust the effectiveness of the nuclear nonproliferation regime, and rely on U.S. unilateral capabilities such as intelligence assessments as the driver for United States policy. In the view of the authors of the Russian background paper, the problems with the nuclear nonproliferation regime simply indicate that new international standards must be agreed upon that would have the double benefit of clarifying the components of nuclear nonproliferation and of providing a standard with which the policies of nuclear states must be consistent, rather than applying a double (or even triple) standard. Further, because the U.S.-Russian cooperative programs meet the vital interests of both countries, linkage of their implementation to any extraneous political condition seemed counterproductive to some participants. In light of the U.S. policy, Russia also faces a tension, in this case between its interest in cooperation with the United States on nonproliferation and its interest in cooperation with Iran on nuclear energy. The United States views the differences on the "Iranian issue" as an impediment to concluding an agreement on U.S.-Russian cooperation on peaceful uses of nuclear energy. Russia views the lack of such an agreement as impeding substantially all related bilateral programs in this area (both on-going and planned), including those on nuclear nonproliferation.

The example above demonstrates a formal linking of funding to other actions. Informal links also exist. For example, an American participant described how the failure of the effort to construct a facility to destroy stocks of solid rocket motor fuel (heptyl) has had an impact on the whole CTR program. There was disagreement among the participants as to the cause of the failure—whether the project was ill-conceived, lacked sufficient political support, or lacked local support—but many workshop participants from both sides noted that new appropriations, even for nuclear projects, come under greater scrutiny because of the $200 million wasted on the failed heptyl project.

[11] The situation with regard to Iran has changed significantly since this workshop was held in September 2003. During a visit of the foreign ministers of France, Germany, and the United Kingdom to Tehran on 21 October 2003, the Iranian government and the visiting officials issued a statement in which Iran expressly forswore nuclear weapons and agreed to cooperate fully with IAEA. Iran provided IAEA with a full nuclear declaration two days later, and signed an Additional Protocol on Nuclear Safeguards on 18 December. During the early months of 2004, however, tensions have risen again over the accuracy and timeliness of the data provided by Iran and over IAEA inspections of Iran's nuclear facilities. Source: http://www.iaea.org/NewsCenter/Focus/IaeaIran/iran_timeline.shtml, accessed 22 April, 2004.

Access Issues

United States officials seek access to Russian nuclear facilities receiving U.S. funds to monitor how the funds are used and what results are achieved, as required by the laws appropriating the funds. Some participants noted that U.S. officials have at times sought detailed data about facilities storing nuclear materials and unfettered access to the closed Russian sites where the programs are being implemented (or are to be implemented), similar to what is expected by U.S. officials visiting U.S. facilities. This has included large numbers of visits and access to not only the Russian laboratory or facility where most of the work is going on, but to other facilities within the site. At some sites, dozens of American groups have visited within a single year, with only a vague articulation of why each visit was necessary or how they related to each other. The authors of the Russian background paper argued that these requests for site access and information are sometimes excessive in number. Some Russian workshop participants also noted that American program staff sometimes make unacceptable requests for confidential analytical data on the vulnerability and effectiveness of physical protection systems at specific facilities.

Russian and American participants agreed that Russian officials and site managers are often unwilling to grant open access to the sites, and sometimes impede access to the facilities where U.S.-funded work is taking place. Some American participants stated that there have been several examples of Americans receiving approvals from Minatom for a site visit, traveling to the site, and finding that they are not granted entry. Some in the United States insist that because U.S. funds are used, the United States should be granted access. Some in the Russian Federation argue that site visits are intelligence-gathering activities that have little to do with ensuring proper project management. Several participants argued that neither of these attitudes is helpful, and that both ignore important realities of the situation. The lack of clarity regarding what information is really needed and what information is truly too sensitive to share has resulted in conflicts that undermine cooperation and delays that impede progress.

Some Russian and American participants observed, however, that progress has been made in this arena. With some restrictions (e.g., a special request notification deadline of 45 days preceding any visit to a Russian classified site), access is granted under the U.S.-Russian cooperative programs using yearly-approved lists of the United States delegates, which are updated once every six months. Only a limited number of multi-entry visas for U.S. specialists involved in the implementation of Minatom programs are granted by Russia because in most cases such work involves visiting sensitive facilities. To mitigate the entry-visa problem, at present Russia grants double-entry visas to Russia for the U.S. specialists for a period of three months. But difficulties remain.

The authors of the Russian background paper noted that Russia recognizes the need for a solution to the issue of access control for foreign partners if Russia is going to attract U.S. private investments, and some Russian participants noted that creative solutions can be found to specific site access problems. The difficulty of obtaining access for American business leaders participating in the Nuclear Cities Initiative was cited as an example. Problems might be solved by removing the relevant facilities from the jurisdiction of the site.

Questions of access to data can be as problematic as site access. As part of the START process, there were early concerns about how to satisfy the United States' demand to verify irreversible dismantlement of nuclear munitions while at the same time addressing Russian concerns that classified information not be disclosed. Studies were undertaken on both sides and the United States demonstrated a flexible approach at the early stages, while Russia strictly limited release of information on the facilities to be dismantled and related technologies. Later on, Russia expressed its readiness for greater openness, but by that time the United States had lost interest in the matter.

Visas

Nationals of the Russian Federation and the United States must obtain visas to visit one another's countries. Prior to the terrorist attacks of September 2001 in the United States, obtaining entry visas was, at times, difficult. Several meeting participants noted that the challenge has increased since September 2001, as the United States has tightened visa policies under the USA PATRIOT Act, expanding the use of procedures such as interviews and fingerprinting, and broadening the scope of agency review of visa applications. Several Russian participants noted that, although they understood the reasons for tightening immigration controls since the events of September 2001, they were concerned about the effects on cooperative nuclear nonproliferation programs of recent changes in United States immigration policy. Russian citizens, including those working on nuclear nonproliferation, undergo increasingly complicated procedures for obtaining entry visas as a result of new visa restrictions. Some workshop participants pointed out that this is negatively effecting the quality of cooperative programs as well as their implementation schedules, and suggested that the problem needs to be addressed at a high level.

Many Russian participants noted that the requirement that all applicants for a visa to visit the United States be interviewed in person is especially problematic. This often causes additional expenses for interviewees if a trip to a U.S. consular office requires travel. It is also irksome because the United States approach seems unbalanced. Because American project participants who hold diplomatic or government passports do not need to be interviewed when applying for a visa to Russia, the U.S. government recently began replacing passports of their specialists with the "right" ones, exempting them from the interviews in the Russian Consulate.

Further, some American participants noted that the new procedures appear to have eliminated mechanisms for expediting visas for Russians working with the United States to control nuclear proliferation, including those who have previously visited the United States for that purpose. New applications for Russian partners seeking entry to the United States often take months rather than weeks to be approved or rejected. In fact, rejections and delays beyond requested entry dates have prevented Russian partners from participating in meetings that promote, or even directly support, cooperative efforts on mutual and international security.

The American background paper noted that the problem is now being compounded as other governments, including that of the Russian Federation, respond to the imbalances in visa requirements by increasing the rigor of their own visa approval processes and imposing restrictions upon Americans traveling in their countries. Several workshop participants

expressed the opinion that it should be possible to meet the need for enhanced visa screening without imposing undue burdens on beneficial international collaborations, especially those that support national and international security. Visa application procedures for specialists from both the United States and Russia could be simplified if they are well-known persons (e.g., included in some pre-agreed lists) involved in the implementation of known (intergovernmental and interdepartmental) projects. The current visa system, however, interferes with both the specific and general goals of U.S.-Russian security collaboration.

Internal Interagency Difficulties

Both American and Russian participants described difficulties in their respective governmental interagency processes. Neither the United States nor the Russian government is organized for maximum efficiency in implementing cooperative nuclear nonproliferation programs. Some American participants argued that the interagency structure in the United States is fairly well defined, but that the process is often weak or non-existent, resulting in poorly coordinated project activity and, at times, duplication of effort. Such duplication, of course, leads to sharp criticism and even greater consequences, such as budget cuts, at the hand of Congress. In the Russian case, the interagency structure has been in considerable flux in recent years, with frequent reorganizations hampering understanding of exactly which agencies must participate in the decision-making process. Agencies not directly responsible for implementation have, as a result, had opportunities to hamper progress or, in some cases, to veto it outright.

LEGAL ISSUES

The maturity of the legislative foundation, the availability of appropriate organizational frameworks and mechanisms to ensure practical application of existing laws, and other legal issues directly affect the implementation of cooperative programs. A comprehensive analysis of legal issues was beyond the scope of the discussion, but specific legal impediments to U.S.-Russian cooperation on nuclear nonproliferation were highlighted in the Russian background paper, namely taxation of the assistance, access control of foreign specialists to WMD destruction facilities, holding tenders for the right of performing WMD destruction-related work, and nuclear liability related issues, including the issue of ratifying the Vienna Convention on Civil Liability for Nuclear Damage.

Taxation

Several of the cooperative programs have an economic-aid component, wherein the U.S. government is the “donor” and Russian federal, regional, and local executive bodies, legal entities, and individuals are the “recipients.” Agreements on cooperation in Russia provide “donors” and “recipients” exemptions from or refund of the value added tax (VAT), income tax, and other taxes collected by the federal budget, when using funds, equipment, labor and other services within the Russian Federation during the execution of cooperative programs. The rationale behind such exemptions is that they enhance the effectiveness of the funds, and that American assistance should support only the activities it has agreed to support, and not the programs supported by the taxes (such as Russia’s national defense).

The Russian background paper stated that there have been no serious complications related to the exemptions related to CTR activities because the tax exemption clause in the CTR agreement is so clear. Even when it expired, the parties signed a protocol in June 1999 extending the CTR program for seven years. Programs have operated provisionally under that agreement as the protocol remains to be ratified by the Russian State Duma.

Tax exemptions under other U.S.-Russian agreements, which were regulated by specific directives of the Russian government and orders of specific ministries and agencies, were much more complicated. The situation improved considerably after enactment of Federal Law № 95 of May 1999 on assistance to the Russian Federation, which brought needed order to the taxation and tax exemption processes, defining for example what forms of assistance make related goods and services exempt from taxes. A number of problems, however, still remain to be addressed:

- Lack of a clear tax exemption mechanism for participants in the scientific and technical assistance programs. This situation results in ambiguous interpretation and execution of the laws as regards the tax exemption/refund mechanism (especially in case of VAT) and, ultimately, slows down the process of the cooperative program implementation.
- Lengthy bureaucratic procedures for granting technical-assistance status to such projects due to insufficient "operating capacity" in the Commission on International Technical Assistance in the Ministry of Economic Development and Trade, which reviews applications.
- Lack in the Federal Law of any direct prescription concerning complete exemption from taxes to be paid to the budgets of Russian regions (i.e., administrative subjects).

Russian laws and regulatory documents on technical assistance to Russia (e.g., the Federal Law № 95 of May 12, 1999, and its implementation instructions) address mainly large-scale and multi-year projects, rather than a variety of short-term contracts executed by Russian enterprises within this program. DOE is proposing a technical assistance program on export control that is outside of the framework of the global MPC&A Program, which afforded tax exemptions. The use of multiple, smaller contracts can overwhelm the bodies that process applications for tax exemptions. This problem is likely to become more acute as the new assistance program comes into force, as it includes short-term contracts (2-3 months, as for training workshops) but receiving a tax exemption certificate takes 3-6 months. Thus, as a practical matter, tax exemptions cannot be provided in time for contracts of less than one year. However, if the contractors do not receive tax exemptions, they may not even be able to cover their own costs.

The Russian background paper suggested that grants from ISTC, the Civilian Research and Development Foundation (CRDF), and other organizations solve the problem of tax exemption to a large extent. However, the export-control requirements related to dual-purpose goods and technologies used in such projects, the complexity and duration of the formal project review and approval processes, and established caps on project costs substantially hinder progress toward attaining project goals.

Nuclear Liability

Disagreement between the United States and Russia concerning liability provisions in their bilateral agreements has delayed extension of both the Nuclear Cities Initiative (which expired September 22, 2003 but had its projects extended by a last-minute agreement between the U.S. Secretary of Energy and the Minister of Atomic Energy of the Russian Federation) and the Plutonium Disposition Science and Technology Agreement (expired on July 24, 2003). Liability protection is of such concern that it is the subject of an agreed statement under the G8 Global Partnership, coming out of Kananaskis: "All governments will take necessary steps to ensure that adequate liability protections from claims related to the cooperation will be provided for donor countries and their personnel and contractors…"[12]

The original CTR agreement provided blanket liability protection for contractors. In addition to shielding United States corporations and scientists in the case of nuclear and non-nuclear accidents, the agreement provided indemnification against claims of premeditated acts that cause injury or death. The United States insists on including this provision in every new or renewed agreement. The Russian background paper stated that Russia is willing to implement a liability exemption, but only within the standards of international law and the framework of the 1963 Vienna Convention on Civil Liability for Nuclear Damage (signed by Russia in 1996 and yet to be ratified by the Russian State Duma), or the Protocol to the Multilateral Nuclear Environmental Program in the Russian Federation (MNEPR) Agreement on claims, legal proceedings, and exemption from liability for damaged property, signed in May 2003 by 10 countries, the European Union, and EURATOM, but not by the United States. Indemnification beyond that, Russia says, runs contrary to civil liability provisions of Russia's Federal Law on International Agreements, which provide for reparation of damages by the guilty person(s). The original CTR agreement preceded this law, passed in 1995, and so was not subject to it.

Negotiations on this subject have virtually reached a deadlock. Several workshop participants observed that the United States and the Russian Federation lack a mutually agreed framework that gives due attention to, on one hand, the Russian government's reluctance to literally pay for the mistakes or premeditated acts of an American contractor, and on the other, the contractors' desire to avoid potentially crippling liabilities.

ISSUES RELATED TO SCIENTIFIC AND TECHNICAL COOPERATION

International Promotion of Peaceful Uses of Nuclear Energy

A number of Russian participants characterized the lack of U.S.-Russian cooperation on promoting the peaceful use of nuclear energy as an impediment to cooperation on nuclear nonproliferation more broadly. Most of the American participants did not see cooperation on nuclear energy as critical to cooperation on nuclear nonproliferation. This difference of perspective illustrates, to some extent, the frustration representatives of the Russian and U.S. governments feel when these issues come up in negotiations. Russia views nuclear energy as an

[12] Quoted in Brubaker, R.D. and L.S. Spector. "Liability and Western Nonproliferation Assistance to Russia: Time for a Fresh Look?" *The Nonproliferation Review*, v. 10, n. 101, Spring 2003.

important industry that it can both capitalize upon through exports and use to actively support nuclear nonproliferation, and Russia has consistently sought to expand the role of Russian nuclear power in other countries. The United States has been ambivalent about expansion of nuclear power for nearly thirty years, although it has increased international cooperation on advanced nuclear reactors and improved fuel cycles in the last five years. Both Russia and the United States hope to improve the economic, safety, environmental, and nonproliferation characteristics of the reactors and the fuel cycles. Possible future cooperation in this arena is discussed in Section 4.2.

Technical Feasibility of Proposals

Some U.S.-Russian agreements have explicitly or implicitly required technical work that may not be scientifically feasible, as noted in the Russian background paper. For example, when the agreement on converting the Russian plutonium production reactors was signed in 1997, some United States and Russian experts were skeptical that the conversions were technically feasible. After three years of joint research and development, in 2000, the governments decided to shut down the reactors without conversion once fossil-fueled power plants are able to replace the heat and electricity generating capacity of the reactors. The Russian background paper observed that while much U.S.-Russian cooperation on nuclear nonproliferation can be accomplished with existing technologies or with modest levels of research and development, technical factors can be impediments to more scientifically ambitious projects. They noted that experience has justified the practice of conducting thorough, joint examinations of the relevance and achievability of scientific and technical objectives at early stages of cooperative programs.

ISSUES RELATED TO PROGRAM ORGANIZATION AND MANAGEMENT

Cooperative programs between governments necessarily require extensive bureaucratic structures to operate. But these very structures, and the processes they generate, can impede cooperative programs in many ways. If either the goals of a cooperative program or specific programmatic procedures are in tension or conflict with established bureaucratic approaches, progress may be delayed, operations may be halted, or funding may be put at risk. Any and all of these reduce the program's effectiveness. Such barriers and impediments can be seen by partners, rightly or not, as evidence of a lack of commitment to cooperative efforts, because apparent priority is given to other, unrelated concerns. Delays, for example, can be construed as resulting from indecision, incompetence, or insincerity by partners in cooperation, and can weaken the trust between the two countries.

Achieving the appropriate balance between central and local control of program operations is a key structural question that must be answered when designing and managing these programs. The Russian background paper proposed a mechanism for establishing this balance. It was suggested that programs be diversified by status and scope because some laboratory specialists express frustration with the progress and results of the U.S.-Russian cooperation on nuclear nonproliferation. On the one hand, the laboratories express a desire to avoid excessive administration, but, on the other hand, when the issues of access control and/or taxation emerge, they look for administrative support from their ministries. An optimum balance could be found

by concluding inter-agency agreements, whose execution should be delegated to specific laboratories. Another layer of bureaucratic impediments arises when bureaucratic authority or responsibilities are not assigned properly. For example, they might not provide sufficient authority to the laboratories for execution of agreed tasks.

Personal Relationships and Managerial Flexibility

Program implementers must achieve a balance between managerial flexibility and the structural consistency necessary for institutional stability as they work together to carry out projects. Several workshop participants noted that an optimal balance cannot be reached early in collaborations because flexibility is attained, in part, through personal contacts between program managers as they gain a better understanding of each other's problems and develop mutual trust and confidence. The challenge for managers is to determine how much latitude they have for creative decision-making within the established rules and use that latitude to the benefit of the overall program. But programs need not start anew with each project. An efficient managerial structure can build upon progress in other areas of cooperation, learning lessons from their experience and emulating their best practices.

Travel Authorizations and Other Bureaucratic Obstacles

Bureaucratic issues are interwoven throughout the problems with entry visas, but completely apart from the need for visas, participants in cooperative programs often must obtain permission from several agencies within their own government to travel internationally. As a recent report says, "In the case of an expert from a Department of Energy laboratory, a typical trip requires laboratory approval, DOE headquarters approval, State Department approval, a Russian visa, and Russian permission to visit a closed area (which typically requires at least 45 days advance notice)."[13] Similar to the process for travel authorization, concurrence requirements apply to approval for many other program activities, often resulting in long lead-times for processing of paperwork for even minor actions. Lack of cooperation among the agencies of one government can result in roadblocks to international cooperation as participants spend time and energy in negotiating the treacherous bureaucratic terrain between departments.

Evaluation and Personnel Issues

Some American participants noted organizational and personnel issues that have impeded cooperation. At an organizational level, the United States lacks institutionalized mechanisms for evaluating and learning from experience to improve cooperative programs. What processes there are for evaluation are underdeveloped or are focused on individual components of U.S.-Russian cooperation, rather than on each piece as part of a larger program with a range of experience. The metrics used for evaluating progress in programs are also underdeveloped, especially with respect to human factors such as training of personnel. For example, without mechanisms that compel DOE to examine its own programs, it will not learn from itself; and without greater input and feedback from specialists outside of the programs, DOE cannot learn from others.

[13] Matthew Bunn, Anthony Wier, and John Holdren, *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan* (Washington, D.C." Nuclear Threat Initiative and the Project on Managing the Atom, Harvard University, March 2003), p. 45.

With respect to personnel, the United States has made errors that hindered cooperation on nuclear nonproliferation. First, as some Russian participants noted, turnover in personnel has resulted in instances where Russian partners have had to work with a different counterpart in the same program nearly every year. This lack of continuity prevents development of trusting relationships based on mutual understanding and hampers the development of institutional memory. Most American participants agreed that high turnover was problematic, but several suggested that it is unavoidable. Second, some people's skills are ill-suited for certain jobs, and the United States and Russia have sometimes put personnel in positions that are a poor match. Because personal interactions are a key element of success, having the wrong person filling an important position can hamper progress.

ISSUES RELATED TO THE LEGACY OF THE COLD WAR MENTALITY

Agreements on international cooperation are made between nations, but the success or failure of these programs depends on the actions of individuals. Several workshop participants noted that personal attitudes and relationships can be critically important, and residual Cold War thinking can undermine cooperative efforts.

The long enmity between the United States and the Soviet Union, which was extremely costly both in lives and money, still affects the relationship between the United States and the Russian Federation. Many people involved in negotiating, funding, and implementing U.S.-Russian cooperation grew up and were educated in the Cold War years. For many, their knowledge base, political views, and attitudes were formed in a period of severe ideological and military confrontation between the two openly hostile coalitions. Despite our nations' non-adversarial relationship today, the Cold War legacy continues to exert an influence on the thinking of younger generations. Miscommunications, setbacks, and delays can easily be misconstrued as proof of negative stereotypes. Mistrust and suspicion often cause unnecessary tension during negotiations and hinder attaining effective arrangements.

Residual Cold War attitudes can be expressed in a number of ways. Because the United States provides most of the funds for cooperative nuclear nonproliferation programs, differences of opinion about those programs among members of the U.S. Congress often surface in the appropriations process. Individual members can block funds, delay action (either intentionally or unintentionally) through investigations, or attach conditions to appropriations legislation that undermine or complicate the programs. Members who take such actions may have any number of reasons for doing so. This may well include a frank belief that the blocking action serves the national security interests of the United States, or even that the action will ultimately strengthen the program by making it possible to introduce improvements. In other cases, however, members of Congress may oppose nuclear nonproliferation cooperation with the Russian Federation on the grounds that the Russian government, by virtue of being the government of the former Soviet Union, is inherently untrustworthy. It is in these situations that Cold War attitudes appear to linger.

Cold War attitudes may manifest themselves more subtly within cooperative programs. The attitudes may take the form of explicit or implicit disrespect or mistrust, as when participants believe that their counterparts are not capable or worthy of being peers and trusted partners in joint projects. An example of such disrespect is evident when American program managers make decisions affecting Russian interests without consulting their Russian counterparts. Similarly, some Russians believe that cooperative programs are merely a front for espionage. This attitude is apparent when, for example, American government staff take a previously-agreed trip to a Russian facility to check on progress, having followed all relevant U.S. and Russian procedures, and are refused entry at the facility because the local directors have security concerns.

FUNDING ISSUES

The United States provides nearly all of the funding for bilateral U.S.-Russian cooperative programs on nuclear nonproliferation. The way funds are appropriated in the United States, however, creates some impediments to effective use of the funds in Russia and other nations. The publicly visible portion of the U.S. budget process begins at the end of January each year when the president conveys his budget request to the U.S. Congress. Congress works on the budget, aiming to pass legislation in the summer, appropriating funds for programs in the next fiscal year, which begins on October 1. In many years, the appropriations laws are not passed by the beginning of the new fiscal year, and "continuing resolutions" allow the U.S. government and the programs it supports to continue to operate as though the previous year's appropriations continued to apply to the new period.

It should be noted that, as the Russian economy has gained strength, the Russian government has demonstrated increasing willingness to contribute financially to nonproliferation efforts generally, including nuclear nonproliferation. Russia's commitment to contribute $2 billion over ten years to the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction is a particularly welcome development in the eyes of the United States and other G8 members.

With regard to U.S. funding of cooperative nuclear nonproliferation programs in Russia, the Russian background paper suggested that additional transparency in financial records would be helpful. Financial information that the United States supplies to Russia is often presented in an aggregate manner that makes it difficult to determine how much funding has been allocated, for example, to support the work of a specific government ministry. In the view of the authors of the Russian background paper, there is not enough transparency in U.S. funding decisions to enable Russian program managers to work effectively.

Preferences Given to Large Research Centers

Some Russian participants noted problems with the United States' preference for funding large research centers, to the neglect of smaller institutes, in the lab-to-lab cooperative programs. In addition to neglecting important components of the research community, this practice gives

preference to institutions that are less able to handle financial matters promptly in implementing short-term contracts, because of their cumbersome financial apparatus.

These participants further noted that for most of the work under so-called "export contracts," the United States does not allow for overhead costs, so project funds end up being used to cover indirect costs rather than just on direct support of the agreed work.

Difficulties with Alternative Funding Mechanisms

Tax problems and the difficulties mentioned above make grants, such as those through the ISTC and CRDF, more attractive for those applying for and receiving funding. But these mechanisms are not without their own problems. Some Russian participants identified one difficulty as the time-consuming procedure for getting the approval for funding of the ISTC projects. Even with partner ISTC projects, where the funding source is known from the beginning, it can take up to a year from submittal of an application until issuance of the contract. These are relatively small projects (as a rule, below $300,000), and thus do not pay for resource-intensive R&D projects.

A greater complication in ISTC projects, however, arises when dual-purpose goods and technologies liable to export control must be procured. Russian export control laws state that delivery of nuclear or dual-purpose goods and technologies is only allowed if an import/export license can be obtained. Operating under ISTC status prohibits transfer of controlled goods and technologies because they can contribute to nuclear proliferation. At the same time, projects related to development of advanced nuclear energy facilities, which employ dual-purpose technologies, are a natural alternative focus for scientists who previously worked on nuclear weapons.

TOOLS FOR OVERCOMING IMPEDIMENTS TO COOPERATION

Many workshop participants said that although the U.S. and Russian governments have succeeded in coping with many barriers and impediments to cooperation on nuclear nonproliferation over the past decade, it is clear that they have found no single solution, no "silver bullet," to do so. Given the variety of barriers and impediments described in the preceding section, this should come as no surprise. The problems that have arisen vary in their legal standing, political impact, technical aspects, and overall importance to the success of the joint projects. With some impediments, it has been possible to make slow progress, continuing—albeit with difficulty—project implementation. In other cases, impediments have stopped the cooperation cold.

One workshop participant offered a list of program characteristics that can improve a specific program's chances for success:

- Specific program goals to which both sides agree at the outset
- An agreed list of specific actions that will signal attainment of program goals
- Links between funding from the U.S. Congress and the agreed goals and actions
- An agreed plan for project and funding responsibility to move from the United States to Russia.

It was noted that, while these characteristics are necessary, they are not sufficient to guarantee program success. This is particularly true with regard to goals or actions which are not quantifiable, but are nevertheless crucial.

During the course of the workshop, and in the background papers, a number of approaches to overcoming impediments to cooperation—both general and specific—were suggested:

- Establishing and institutionalizing mechanisms for interaction at all levels of cooperation
- Identifying and seizing new opportunities for international cooperation, such as on developing proliferation-resistant nuclear energy technologies
- Facilitating changes in national law, policy, or procedures
- Creating mechanisms for communicating and disseminating the benefits of experience among program participants
- Prioritizing mechanisms

In the following section, we describe these approaches, provide examples of each, and consider how they might be applied in future.

MECHANISMS FOR INTERACTION AT MULTIPLE LEVELS

When developing and implementing new cooperative programs, or attempting to improve current ones, efforts to encourage and develop interactions between the United States and Russia at all levels of official cooperation are of crucial importance. There are a number of existing and potential mechanisms for interaction between the United States and Russia, and they range from high-level, international interactions to those between individual program participants.

Interactions Within the International Community

The proliferation of nuclear weapons, of course, is not only a problem for the United States and Russia. As the background materials for the workshop suggested, nuclear weapons and materials pose a global threat, and the security challenges they present are often most effectively addressed in the context of the international community. Although operating in a multinational environment can involve painstaking negotiations and difficult compromises, the benefits of multinational cooperation may be considerable once agreement is reached. By distributing responsibility for a project among several nations, multinational collaborations may decrease the negative effects of strained bilateral relations on projects, reduce the financial burden on individual nations, increase the number of parties having a direct interest in a successful outcome, and generate support within the broader international community.

Several important examples of international interactions were discussed during the workshop:

- The international effort to help Russia dismantle its nuclear submarine fleet. As noted earlier, the United States provided Russia with equipment for dismantling ballistic missile submarines but does not fund the dismantlement of attack and cruise-missile submarines. The fleet, however, poses significant environmental risks, and Japan and Norway in particular have strong interests in seeing Russia's fleet of attack and cruise-missile submarines dismantled safely. Japan and Norway, with the help of several other nations, are therefore providing funds for the dismantlement effort. In 2003, the contributions are expected to total $32.8 million.[14] This cooperation is part of the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, mentioned above.
- Other examples of the potential of international interactions under the G8 Global Partnership are in the area of chemical weapons destruction—a major effort to which a number of countries have been contributing—and safe storage of nuclear waste materials.
- It is hoped that the Multilateral Nuclear Environmental Program in the Russian Federation (MNEPR) will reduce the problems associated with the taxation of funds for programs being financed internationally.
- The International Atomic Energy Agency (IAEA) clearly plays a crucial role in reducing nuclear proliferation risks, not only through safeguards and verification but also by facilitating the sharing of information among states and providing a forum in which international standards can be established and rigorously tested. As well, the IAEA

[14]"Russia to unload spent fuel from 20 nuclear submarines this year," *Associated Press*, 25 September 2003. Under a Russian-Italian agreement signed in November 2003, Italy will provide 360 million euros.

provides opportunities for bilateral cooperation in several areas designed to prevent and combat nuclear terrorism.

- The Nuclear Nonproliferation Treaty and its associated regimes and institutions offer a number of opportunities for increased cooperation between the United States and Russia on nuclear nonproliferation. One such example is the IAEA, noted above. Another is the regular NPT review process, during which states parties to the treaty reassess the treaty provisions in light of current events and trends. Export control regimes such as the Zangger Committee and the Nuclear Suppliers Group provide opportunities for cooperatively restricting the export of materials or technology which may contribute to proliferation.

Government-to-Government Interactions

A number of Russian participants noted, and American participants generally agreed, that the development and implementation of bilateral U.S.-Russian cooperative programs in this very sensitive area should be increasingly converted from programs consisting of U.S. economic, scientific, and engineering assistance to Russia to cooperative programs based on equal partnership and balanced inputs of intellectual, material, and financial resources. This is especially true given Russia's recovering economy, the nuclear capabilities of the United States and Russia, and the high international nuclear nonproliferation profiles of the two countries. The recent highest-level declaration of Russia's intent to contribute about $2 billion to the success of the "Global partnership" program within 10 years started the transition of Russia from the category of a recipient country to a partner, which undoubtedly should have a positive impact on Russia's cooperation with other countries, including the United States.

Many workshop participants pointed out that the support of high-level political leadership is important to the success of joint nuclear nonproliferation programs. Some Russian participants suggested that a cooperative program has a better chance of success if its major goals, subject scope, organization, and management issues are discussed and agreed upon in intergovernmental agreements, and, if necessary, ratified by the U.S. Congress and the State Duma of the Russian Federation. Several agreements were cited, in the background materials and during the workshop, as examples of government-to-government agreements which, with high-level support, contributed significantly to facilitating U.S.-Russian bilateral cooperation. The essence of these agreements rapidly reached the public community in both countries, contributed to the enhancement of cooperative activities, and gave an impetus to the managerial structures directly concerned with the development and implementation of cooperative programs.

Of course, there is ample precedent for the role of government-to-government agreements in cooperation between the United States and Russia. As was mentioned previously, at the outset of the cooperation on nuclear nonproliferation in 1992, the United States and Russia completed the Cooperative Threat Reduction (CTR) Umbrella Agreement which provided the first legal underpinnings for the CTR program in the Department of Defense, and, later, for additional cooperative nuclear nonproliferation programs in the Department of Energy. Other government-to-government agreements were negotiated to lay the foundations for additional cooperative programs, such as the Plutonium Disposition Science and Technology Agreement in July 1998 and the Nuclear Cities Initiative Agreement in September 1998.

Such agreements are typically negotiated with the full permission and oversight of the respective interagency authorities in both countries. These agreements therefore enjoy high legal and political status in the two governments. As such, they can provide much-needed authority to advance implementation of joint activities.

While such agreements are necessary legal instruments, however, they may not always be sufficient. For example, access to Ministry of Defense facilities in Russia has not ensued simply on the basis of the CTR Umbrella Agreement, but has required a significant amount of agency-to-agency negotiation of special access arrangements.

Joint Coordinating Committees

Several Russian participants noted a number of program management practices that they have found worthy of emulation. These include the establishment of ministerial joint coordinating committees and joint consultative and coordinating groups comprising lead scientists and specialists of both countries. They also promoted transparent project implementation based on a wide access to related scientific, technical, organizational, administrative and financial information. Both Russian and American participants noted that joint coordinating committees provide a high-level mechanism for making decisions and addressing problems. Because they meet on a regular basis, they can give an impetus to cooperative programs by imposing regular deadlines upon project managers. If, for example, a specific project is reviewed during the regular committee meeting, the managers for that project know that they must show progress, or have explanations for the lack of it, by the next meeting. By the same token, a joint committee with a high-level membership is in a political position to lend support to program managers who need it to meet their short-term goals. The Joint Coordinating Committee for the International Nuclear Safety Program, mentioned above, may serve as a useful example of this sort of collaboration. One Russian participant noted that, while creating a new bureaucratic entity is not always an effective solution to a problem, a joint coordinating committee on these issues might well be helpful.

The authors of the Russian background paper suggested the creation of a bilateral U.S.-Russian commission on nuclear nonproliferation to directly coordinate the implementation of bilateral projects on nuclear nonproliferation, including issues of confidentiality and information protection. Based on specific arrangements with agencies involved in cooperation on nuclear nonproliferation, this commission could facilitate the coordination and prioritization of projects, project selection, and progress reporting. An example of this sort of collaboration is the U.S.-Russian Joint Commission on Economic and Technological Cooperation. This commission is no longer operating, but during its tenure it regularly reviewed a variety of the U.S.-Russian cooperative issues on nuclear energy and identified new opportunities for interaction between the countries.

Agency-to-Agency Agreements

Agreements between implementing agencies of both countries were also considered by some to be vital to successful cooperation. With the CTR Agreement as the legal umbrella, agencies

such as the Department of Energy and the Ministry of Atomic Energy have negotiated and signed at their level implementing agreements to address the particular issues and concerns related to their specific programs. Examples of agency-to-agency implementing agreements include the access agreements that were negotiated for the Nuclear Cities Initiative and the special project management arrangements that were established for the Plutonium Production Reactor Shutdown Agreement.

Some participants, both American and Russian, suggested that such agency-to-agency agreements are especially important in dealing with barriers and impediments to cooperation on nuclear nonproliferation because they flow from the particular experiences and concerns accumulated in the course of project implementation. Project managers are able to sit down with their counterparts and articulate exactly what steps will be required to facilitate progress. This type of specificity has been important to the Russian project managers, who must respond to often-expressed concerns about blanket requests for access or information. As noted above, Russian officials often suspect that the United States is simply engaged in intelligence-gathering pursuant to the joint projects. Thus, when the United States is able to narrow its requests to areas that are clearly relevant to project management or implementation, it eases concerns on the Russian side.

The background documentation noted that a side benefit of this agency-to-agency activity is that it has brought Russian experts into contact with project management methods that are standard in U.S. practice. This, in turn, has eased mutual understanding of the most efficient way to accomplish milestones and deadlines in project implementation. This understanding is particularly important in large construction projects with major engineering components, such as the plutonium production reactor shutdown effort.

Manager-to-Manager Working Methods

Several workshop participants also suggested that, although implementing agreements have been a key element in agency-to-agency collaborations, project managers define working methods during the course of a particular project. Thus, for example, the Department of Energy has worked together with the Russian Navy to develop routine procedures for Navy sites. These include a site survey, vulnerability assessment, initial installation of "quick fixes" (such as simple security improvements to doors and windows), and longer term security upgrades (e.g., new fences, alarm systems, guard towers).

It was suggested that a key to the success of manager-to-manager relations across programs has been the maintenance of small project teams. Experience indicates that if teams of a few people (4-6) on each side are designated and sustained over time then the individual trust they build within their small group may be carried over into the broader range of cooperative programs, helping to build the confidence needed to develop working methods in real time, when agency regulation or procedure to guide an operation might be nonexistent. In those instances, Russian and U.S. managers have to fall back on mutual confidence that they can accomplish the task of enhancing nuclear security, without causing breaches of security in other areas. It was noted that one problem with such small teams is that the individuals involved become exhausted from

repeated project trips in very difficult circumstances. Manager burn-out is a constant problem in the most effective and fast-moving programs.

Information Sharing and Coordination

Effective communication is clearly important in any cooperative venture. Several workshop participants suggested that communication has been a challenge for cooperation on nuclear nonproliferation between the United States and Russia, but that some programs have devised mechanisms for encouraging effective communication.

The International Nuclear Safety Program (INSP) was cited as a good example of successful efforts to communicate effectively in a joint technical program, for several reasons. The program managers believed strongly in transparency, and that belief was reflected in the highly detailed nature of the information that they shared. The information was shared on a regular basis. Program managers took pains to ensure that everyone who needed information received it, via both the Internet and paper reports. Secrecy and access to classified information can complicate efforts at information sharing, but useful information, similar to that described for INSP, can be shared, even for programs that require some secrecy.

One Russian participant argued that the United States and Russia should establish a mechanism for sharing sensitive information that is of mutual interest but should not be made public. An American participant disagreed, pointing out that such mechanisms exist already and that the cooperative nuclear nonproliferation programs fail to use them. Another American, however, argued that both governments should do more to facilitate the sharing of sensitive information, and suggested that some of the problem could be ameliorated if each party's limits of classification were clearly delineated.

Informal Discussion Meetings

Several participants in the meeting from both countries expressed a belief that similar informal meetings would be useful in the future. They found it beneficial to interact with their counterparts without being restrained by negotiation guidelines, outside of the protocols which govern official meetings, and without concern that their comments would later be used against them or their programs. By facilitating open dialogue and exchanges of views, such meetings may be useful in helping to identify problems, solutions, and opportunities.

Exchanges of Personnel as Confidence-Building Measures

A number of Russian participants predicted that, despite some mistrust between the sides which was inherited from the past, the long-term strategic interests of the United States and Russia in nuclear nonproliferation meet and will prevail over the short-sighted subjective considerations and interests of some managers. To this end, one of the priorities of bilateral programs should be the education, training, and promotion of specialists and managers belonging to the new generation of people who are relatively free of the negative heritage and capable of working efficiently in realities of the changed world. In particular, expanded and more balanced exchanges between the students of military and civil universities and colleges, groups of officers,

scientists, and professors will contribute to the effectiveness of interactions and cooperation between the two countries in solving nuclear nonproliferation issues. Bi- and multi-lateral scientific conferences and workshops on nuclear nonproliferation should therefore be conducted on a systematic and regular basis.

Some workshop participants also suggested that the need to take responsibility for the risks inherent in cooperation on nuclear nonproliferation can be eased through such general confidence-building activities that improve the bilateral relationship over time. Military-to-military contacts between the United States and Russian Federation were cited as an important example, and it was noted that they have played an important role over the past decade in developing the policy environment that has enabled threat reduction cooperation to advance in both the Ministry of Defense (MOD) in Moscow and the Department of Defense (DOD) in Washington. It seems possible that some of the difficulties encountered in implementing the MOD-DOD programs have come about because of the reduction in military-to-military cooperation that occurred after disagreements over the conflict in the former Yugoslavia. Restoring military-to-military contacts to the level that they enjoyed earlier in the 1990s might thus enable an acceleration in the defense threat reduction programs.

Both American and Russian workshop participants suggested that there are several types of exchanges that build cultural understanding, professional competence, and relationships between individuals, all of which can contribute both directly and indirectly to the quality and efficiency of cooperation on nuclear nonproliferation.

- Exchanges by students of military schools and colleges. Such exchanges could be very useful in helping to educate a new generation of specialists who are capable of understanding the positions of their partners on negotiations and whose ability to compromise is not weakened by latent Cold War attitudes. Russian and U.S. officers who studied at one another's military education institutions would clearly have much to offer the ongoing collaboration on nuclear nonproliferation. The importance of achieving a balanced exchange of people and information was noted.
- Regular exchanges by groups of officers for short-term training at institutions responsible for nuclear nonproliferation
- Exchanges by undergraduate and graduate students for education on relevant subjects
- Exchanges by groups of scientists for advanced training at research centers studying issues related to national and international security
- Enhanced exchanges involving individual scientists to give lectures on topical problems related to nuclear nonproliferation
- Organization of regular bilateral conferences and workshops on nuclear nonproliferation

It was suggested that development of new joint programs on training exchanges would contribute to the establishment of closer contacts and mutual understanding between the specialists of the United States and Russia involved in the implementation of bilateral projects on nuclear nonproliferation.

Inter-laboratory programs between the nuclear weapons laboratories in the United States and Russia, so-called lab-to-lab cooperation programs, were touched upon briefly in the workshop.

The Russian background paper noted the great importance of these programs and suggested that the ultimate success of the lab-to-lab programs was attributable in part to the development of umbrella cooperative agreements. Such umbrella agreements do not require that general conditions of interactions be stipulated within every contract as regards specific activities and, thus, facilitate the contract consent processes both at DOE and Minatom. The Russian background paper suggested that these interactions so far have been mainly a one-way street, with funds moving from the United States to Russia and information moving from Russia to the United States. According to some Russian workshop participants, possibilities for a more balanced cooperation have begun to emerge.

INTERNATIONAL DEVELOPMENT OF PROLIFERATION-RESISTANT NUCLEAR ENERGY TECHNOLOGIES

A number of workshop participants highlighted the importance of seeking out and exploiting new opportunities for international scientific cooperation that will strengthen collaborative nonproliferation efforts. For instance, the Russian background paper, and most of the Russian participants, heavily emphasized the potential role of cooperation on commercial nuclear energy in the international nuclear nonproliferation regime, suggesting that the goal of nuclear nonproliferation will only be realized when the burden of obtaining and possessing nuclear weapons substantially outweighs the perceived benefits. In other words, the political and economic costs of entering the nuclear club should be made high enough to render entrance too expensive and therefore unjustifiable. In the view of Russian participants, "negative reinforcement," such as attempting to restrict the access of non-nuclear weapon states to nuclear technology, has met with limited success in curbing nuclear proliferation. They argued that, as an alternative, the United States and Russia should cooperate with the international community to adopt a more positive approach, one which facilitates the adoption of commercial nuclear energy in ways that strengthen rather than weaken the international nuclear nonproliferation regime. U.S. scientists and engineers for years have worked on designing proliferation-resistant nuclear power reactors and nuclear fuel cycles, but these projects have not had the benefit of official U.S.-Russian cooperation in this arena. A range of potential collaborative projects was proposed:

- International development of advanced and innovative nuclear energy technologies that are capable of ensuring proliferation resistance by an optimum combination of predominantly intrinsic features (technologies and materials) and extrinsic measures (IAEA safeguards, nuclear material protection, control and accounting, export control)
- Expanded use of permanent instrumental monitoring systems to eliminate unauthorized modifications in reactors or fuel-cycle facilities
- Cooperation between the United States and Russia to develop a methodology for assessing the resistance of specific nuclear energy technologies and facilities to nuclear proliferation, especially via theft. This methodology would be internationally acknowledged and implemented.
- The development of international standards on nuclear nonproliferation which would operate within the NPT framework. Such standards could comprise an agreed classification of nuclear facilities, taking the national security concerns of collaborating

countries into account. They could also specify comprehensive, symmetrical data sets on such facilities, which participating countries could agree to provide.

- The creation of a mechanism for ensuring fair competition by the United States, Russia, and other nuclear countries in the markets of non-nuclear countries to support this expanded nuclear nonproliferation complex.

The Russian background paper cited several steps that have already been taken toward a more positive approach to nuclear nonproliferation, including the HEU Purchase Agreement, cooperation on disposition of weapons-grade plutonium, and ongoing multilateral efforts to develop proliferation-resistant nuclear technologies. There are now two parallel international efforts in this latter arena, the Generation IV International Forum (GIF) and the International Project on Innovative Reactors and Fuel Cycles (INPRO). In 2000, DOE initiated GIF, in which ten nations and one association participate. INPRO was initiated by President Putin and taken up by the millennium IAEA General Conference. Organized under the IAEA, the project involves 15 nations—including five GIF members—and the European Commission. Neither Russia nor the United States participates in both, and efforts to combine the programs have stalled because of the two countries' disagreement over Iran. A number of Russian participants pointed out that the failure of the United States and Russia to cooperate on the development of nuclear energy, and disagreements between the United States and Russia on these issues—particularly with regard to Iran—constitute impediments to cooperation. These disagreements and failures to cooperate are hindering the expansion of joint bilateral research and development on advanced nuclear reactors and fuel cycle technologies which are resistant to nuclear proliferation. It was suggested that the collaborative measures cited above might be able to simultaneously help overcome these obstacles and bolster the international nuclear nonproliferation regime.

CHANGES IN NATIONAL LAW, POLICY, AND PROCEDURES

Changes in national law or the introduction of new laws often require a number of steps in the national political process (whether Russian or American), a significant amount of time, and effective enforcement to accomplish anything. For that reason, pursuit of new laws has not been a frequent mechanism used to speed or ease implementation of nuclear nonproliferation programs. More frequent have been steps worked out on a bilateral basis within the structure of existing laws.

When the United States and Russia embarked on the "cooperative threat reduction" or Nunn-Lugar program in 1992, they had few precedents to guide them. On-site inspections in the arms control process had begun only a few years before, with the implementation of the Intermediate-Range Nuclear Forces (INF) Treaty. Prior to that time, there had been no routine way for Russians to visit U.S. military nuclear facilities, or vice versa. As far as the weapons laboratories were concerned, the nuclear scientists on each side had built up an enormous stock of respect for the work of their counterparts, but they had had few opportunities to interact with them directly, and no opportunities to visit each other's facilities. Thus, the nuclear nonproliferation threat reduction programs were stepping out into virgin territory.

It was suggested that, in this context, the programs achieved a high success rate with relatively few changes to national laws, given the extreme sensitivity of many of the sites involved in the cooperation. In the U.S. case, legislative activity has been focused on providing authorization and appropriations for the programs through the normal congressional budget process, which has enabled new legal language to be generated in budget acts according to needs and requirements. As part of this legislative process, conditions are sometimes attached to the funding of cooperative nuclear nonproliferation programs. In some instances, these conditions have themselves constituted impediments to implementation. In other cases, the conditions have been helpful in moving the cooperation forward, such as in the case of the condition that noted the need for increased Russian funding to the Schuch'ye chemical-weapons-destruction plant.

Although relatively few changes to national law have been required to implement the programs, in some cases national law has had an enormous impact on that implementation. This has been the case, for example, with the changes in visa regulations that have flowed from the USA PATRIOT Act, mentioned previously. It was noted, however, that these new regulations have impacted a wide range of international cooperation, not only those involved with Russia or on cooperation on nuclear nonproliferation. It is within this broad international context, therefore, that the consequences of the act—and any future modifications of it—should be considered.

Implementing procedures or regulations can also be changed without impacting the law itself. For example, as discussed elsewhere in this paper, U.S. and Russian consular officials might decide to streamline procedures or introduce special technologies ("smart passes") that would enable an acceleration in the issuance of visas. This streamlining would be within the existing law, but would refine its implementation.

Interagency relations in each country also have the potential to either hinder or facilitate cooperation on nuclear nonproliferation. Some of the background materials suggested that, in the U.S. case, the interagency structure is fairly well defined, but the process is often weak or non-existent, resulting in poorly coordinated project activity and, at times, duplication of effort. Such duplication, of course, leads to sharp criticism and even greater consequences, such as budget cuts, at the hand of Congress. In the Russian case, the interagency structure has been in considerable flux in recent years, with frequent reorganizations hampering understanding of exactly which agencies must participate in the decision-making process. Agencies not directly responsible for implementation have, as a result, had opportunities to hamper progress or, in some cases, veto it outright.

The Russian background paper called for the appointment of a single senior official in each government who would work to improve coordination of all cooperative nuclear nonproliferation activities. The official would report to their respective president and head interagency groups on nuclear nonproliferation. Some participants suggested that this "tsar" should even have some authority over the budgets that individual agencies garner for implementation of the programs. Others did not go as far, but urged instead that, rather than a tsar, a more coherent and focused interagency process should be sought within the normal structure of the executive department. Such a process would coordinate, but would not have direct influence on budgetary decisions or their implementation.

MECHANISMS FOR DISSEMINATING THE BENEFITS OF EXPERIENCE

Many workshop participants suggested that it is important that participants in different programs communicate well with one another. It was suggested that a multi-program effort such as MPC&A will be most effective when the people involved in specific programs are aware of the situation in other programs and how their work relates to the overall effort. By providing opportunities for program participants to learn from the experiences of others, effective communication across programs also helps to build a common body of institutional knowledge upon which new staff members can draw when they begin their work. It was suggested that it is important to actively encourage and guide the development of institutional knowledge as part of a well-developed personnel policy, because such a body of knowledge can serve as part of the mechanism for generating, communicating, and enforcing system-wide performance expectations, and because new employees can draw on this body of knowledge to ease their transition into a cooperative nuclear nonproliferation program.

Several types of mechanisms for disseminating information were discussed. Workshops and conferences are clearly useful mechanisms for sharing ideas and experience. They not only provide venues for American and Russian program managers to interact outside of official channels, but also create opportunities for program participants to exchange ideas with experts who are not directly involved with cooperative nuclear nonproliferation programs. However, many of those involved in collaboration already have a grueling travel schedule, and some information may be most effectively imparted in the form of a report. Therefore, a system which provides well-coordinated, reliable dissemination of relevant material on paper and via the Internet, as demonstrated by the INSP program, might also enhance inter-program communication. Finally, there may be substantial benefit in establishing a unified program evaluation system which is transparent to program participants. This would provide a mechanism for negotiating and striving to meet an agreed set of program goals, for assessing where individual programs might make improvements, and for creating an institutional memory from which both new and experienced program participants can learn.

The Russian background paper noted that the goal of educating, training, and promoting a new generation of specialists and managers goes far beyond the scope of the current project and requires the long-term, large-scale, and concerted efforts of the governments and other political, scientific, and cultural institutions of both countries. It could become one of the strategic goals of the United States and Russia for the foreseeable future. Only a new generation of people, free of the negative stereotypes of the Cold War and possessing a fundamentally changed mentality, can irreversibly cement the relations of confidence, friendship, and cooperation between the United States and Russia. This transformation will be neither quick nor painless.

PRIORITIZING MECHANISMS

The need for mechanisms to establish priorities within cooperative nuclear nonproliferation programs was expressed repeatedly by both Russian and American participants during the workshop. It was argued that failures to establish agreed program priorities when programs were just beginning have increased the difficulty of completing the projects and resulted in misplaced effort. Improving the process of establishing program priorities would be quite useful in providing guidance to program participants as they make daily decisions about how to allocate time, funding, and other resources.

OTHER TOOLS AND FIXES

Exemptions and Waivers

Exemption and waiver systems have significant potential for addressing the types of bureaucratic roadblocks that are inevitable in a collaboration such as this one. Given the scale and complexity of the network of cooperative nuclear nonproliferation programs, the process of rapidly correcting the root causes of a particular problem may be more destructive than the problem itself. The use of tools such as exemptions and waivers provides the opportunity to solve immediate problems without having to wait until their more fundamental causes have been addressed.

One example that was cited was the use of waivers or exemptions to overcome the visa and site access problems that increasingly plague cooperation between the United States and Russia on nuclear nonproliferation. The goal would be to substantially reduce the number of people in both countries who must repeatedly apply for visas and access clearances to perform their regular duties.

"Ad Hoc" Arrangements

The first few years of cooperation between the United States and Russia on nuclear nonproliferation projects saw a number of "ad hoc" arrangements to enable project work to move forward, often on the basis of last-minute decisions undertaken by facility managers or security directors. It must be stressed that these arrangements were not in contravention of Russian law or regulation, but simply fell into unknown territory. The United States and Russia had never worked together at sensitive sites in the past, with a few exceptions, such as on-site inspections under the INF Treaty. Ad hoc arrangements thus arose out of the necessity of getting work done in unique circumstances, where the two countries had no agreements to fall back on, but were committed to establishing and carrying forward the cooperation. Sometimes, those involved were working under a commitment set at a very high level, such as at a presidential summit, and therefore they were accorded some political cover. In other circumstances, however, progress came because individuals were willing to proceed, essentially on their personal recognizance.

In latter years, such ad hoc arrangements have occurred mainly in the context of high level activities, such as ministerial visits. In these cases, the hosting minister has often taken personal responsibility for negotiating special access to sensitive sites or other arrangements with counterpart ministries—thus placing a heavy burden on his store of political capital. It is no surprise, therefore, that willingness to pursue ad hoc arrangements has become more and more rare at high levels in Moscow. Likewise, as attention to the cooperative programs has risen in the Russian Duma and in other agencies such as the Federal Security Bureau (FSB), ad hoc arrangements have virtually disappeared at the facility level.

While ad hoc arrangements have been useful to the programs historically, it is not surprising that they should recede as the programs develop a system of agreements and procedures to underpin implementation. In essence, as project work becomes more routine, there naturally are fewer stretches of unknown territory where the two sides have no precedent—whether legal or experiential—to rely on. Ad hoc arrangements, therefore, will naturally become more rare, but it was suggested that they must not be abandoned altogether. At times, intervention from an individual willing to take responsibility—whether minister or facility manager—might be necessary to accomplish an urgent project goal. It was noted that this necessity should be acknowledged on both sides.

CONCLUSION

After two full days of discussion, the workshop ended cordially. Workshop participants from both countries expressed the view that the workshop had been a success. They noted that the informal setting, free of explicit negotiation instructions from their governments, had been extremely beneficial, laying the foundation for a fruitful, informative discussion. Many participants suggested that the results of the workshop be followed up to identify and propose a specific joint study within the framework of the Joint Committee on U.S.-Russian Cooperation on Nuclear nonproliferation. Participants were hopeful that the achievements of the workshop boded well for the future of cooperation between the United States and Russian Federation on nuclear nonproliferation.

APPENDIX A: STATEMENT OF TASK

The Overall Project

The U.S. National Academies and the Russian Academy of Sciences will engage in activities to support strengthening, accelerating, and expanding U.S.-Russian cooperation on nuclear nonproliferation. U.S. and Russian committees will collaboratively review the existing U.S.-Russian cooperative programs on protecting nuclear weapons, nuclear-weapon components and materials, nuclear-weapon-relevant technologies, and nuclear-weapon expertise and will make recommendations to their respective governments about how the scope, effectiveness, pace, and sustainability of these programs could be improved.

This Report

Among other activities, the committees will convene a joint workshop to identify methods of overcoming impediments to cooperation between the United States and Russia on nuclear nonproliferation. The workshop will emphasize approaches and techniques that have already been shown to work in U.S.-Russian programs and that might be applied in other areas. The workshop is intended to facilitate frank discussion between individuals in the United States and Russia who have some responsibility for cooperative nuclear nonproliferation programs in the hope of identifying both the impediments to cooperation and potential methods of addressing them. The report will summarize the discussions at the workshop.

APPENDIX B: PARTCIPANTS LIST

National Academies Meeting on Overcoming Impediments to
U.S.-Russian Cooperation on Nuclear Nonproliferation
September 22-23, 2003
IAEA Headquarters, Vienna

U.S. and Russian Committee Members
Evgeny Avrorin (VNIITF)
Leonid Bolshov (IBRAE RAS)
William F. Burns, MG, USA, Ret., Project Co-chair
Frank von Hippel (Princeton University)
Rose Gottemoeller, Project Co-chair (Carnegie Endowment for International Peace)
William Potter (Monterey Institute)
Ashot Sarkisov, Project Co-chair (IBRAE RAS)

IAEA Participants
Tariq Rauf
Thomas Shea

Other Russian Attendees
Natalia Klishina (Minatom)
Sergey Ruchkin (IBRAE RAS)
Vladimir Rybachenkov (Ministry of Foreign Affairs)
Vladimir M. Shmelev (Kurchatov Institute)
Vladimir K. Sukhoruchkin (Kurchatov Institute)
Rodion Voznyuk (VNIITF)
Yury Zabaluev (Ministry of Economics and Development)

Other U.S. Attendees
Gene Aloise (General Accounting Office)
John Gerrard (Department of Energy)
Dori Ellis (Sandia National Laboratories)
Glen Levis (General Accounting Office)
William Moon (Defense Threat Reduction Agency)
Mark Mullen (Los Alamos National Laboratory)

National Academies Staff
Christopher Eldridge
Amy Giamis
Jo Husbands
Micah D. Lowenthal

APPENDIX C: GLOSSARY

CRDF	Civilian Research and Development Foundation
CTR	Agreement on the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation, 1991 (Nunn-Lugar Cooperative Threat Reduction Program)
DOD	United States Department of Defense
DOE	United States Department of Energy
Disarmament	The reduction of military forces and equipment
GIF	Generation IV International Forum
HEU	Highly-Enriched Uranium
IAEA	International Atomic Energy Agency
IBRAE RAS	Nuclear Safety Institute of the Russian Academy of Sciences
INF	Intermediate-Range Nuclear Forces Treaty, 1988
INPRO	International Project on Innovative Nuclear Reactors and Fuel Cycles (under the aegis of the IAEA)
INSP	International Nuclear Safety Program
IPPE	Institute of Physics and Power Engineering (Obninsk)
ISTC	International Science and Technology Center
LEU	Low-Enriched Uranium
MNEPR	Multilateral Nuclear Environmental Program in the Russian Federation, 2003
MOD	Ministry of Defense (refers in this report to the Russian Ministry of Defense)
MPC&A	Nuclear material protection, control, and accounting. This acronym refers in a general sense to the protection, control, and accounting of nuclear materials and in a specific sense to the cooperative program run by the U.S. Department of Energy.
Minatom	Ministry of Atomic Energy of the Russian Federation
NPT	Treaty on the Non-proliferation of Nuclear Weapons, 1970
Nuclear Nonproliferation	Preventing states or non-state actors who do not currently have a nuclear weapon or nuclear weapons capability from acquiring the materials, technology, and information required to obtain a nuclear weapon or nuclear weapon capability.
SOAE	Agreement on Cooperation in the Elimination of Strategic Offensive Arms, 1995
SORT	Strategic Offensive Reductions Treaty, 2002
SSBN	Strategic Submarine Ballistic Nuclear (nuclear-powered submarine carrying ballistic nuclear missiles).

SSGN	Strategic Submarine Guided Nuclear (nuclear-powered submarine carrying nuclear or conventional cruise missiles).
SSN	Strategic Submarine Nuclear (nuclear-powered attack submarine)
START	Strategic Arms Reduction Treaty, 1991. Now often referenced as START I. Negotiations began on START II and then START III, but they ended in favor of the Strategic Offensive Reductions Treaty.
TTBT	Threshold Test Ban Treaty, 1974
USA PATRIOT Act	Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act of 2001
VAT	Value-Added Tax
VNIIEF	All-Russian Scientific Research Institute of Experimental Physics (Sarov)
VNIITF	All-Russian Research Institute for Theoretical Physics (Snezhinsk)
WMD	Weapons of Mass Destruction

APPENDIX D

Analysis of Problems and Impediments to Cooperation Between the U.S. and Russia on Nuclear Nonproliferation and Ways of their Elimination or Mitigation

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Introduction

Bilateral U.S.-Russian cooperation on nuclear nonproliferation is principally aimed at strengthening the international nuclear nonproliferation regime, as a component of the international collective security system. Further progress in this area depends to a large extent on the results of the bilateral U.S.-Russian cooperation.

The international nuclear nonproliferation regime comprises a set of legal, organizational, administrative and technical measures to prevent the diversion or undeclared production of nuclear fissionable materials, or undeclared use of technologies by a non-nuclear state for the purpose of acquiring nuclear weapons or other nuclear explosive devices.

The key elements of the international nuclear nonproliferation regime are as follows:

- The Treaty on the Non-proliferation of Nuclear Weapons (NPT). The NPT came into force in 1970 and, due to active involvement of nuclear states, was extended in 1995 for unlimited duration. Having been signed to date by 187 countries, the NPT became virtually a universal document,
- The nuclear safeguards system of the International Atomic Energy Agency (IAEA),
- The nuclear export control system: the Zangger Committee (created in 1971) and the Nuclear Suppliers Group (created in 1975), and
- The International Convention on Physical Protection of Nuclear Materials During Their Use, Storage and Transportation (1987).

There are two major types of nuclear nonproliferation: nuclear nonproliferation in the nuclear-weapon states and that in the non-nuclear-weapon countries. As regards nuclear states, the nuclear nonproliferation issues—and the main subject of the present study—have two dimensions:

- Commercial peaceful use of their nuclear technologies in non-nuclear countries with no threat of their diversion to military or terrorist purposes (this is an external dimension of nuclear nonproliferation for the nuclear states)
- Physical protection, control and accounting, including export control, of national fissionable and radioactive materials, relevant equipment and technologies (an internal dimension of nuclear nonproliferation for the nuclear states).

The Project entitled ”Analysis of problems and impediments to cooperation between the U.S. and Russia on nuclear nonproliferation, and ways of their elimination or mitigation“ has been developed within the framework of the Joint U.S.-Russian Academies Committee on nuclear nonproliferation headed by J.P. Holdren (U.S.A.) and Academician N.P. Laverov (Russia). Major General W.F. Burns (U.S. Army, ret.) and R. Gottemoeller lead the Project on the U.S. side, and Academician A.A. Sarkisov on the Russian side. Academician E.N. Avrorin (Russian Federal Nuclear Center VNIITF) and Alternate Member of RAS L.A. Bolshov (IBRAE RAS) are the Project participants on behalf of the Russian Academy of Sciences (RAS). In addition to RAS representatives, some leading experts in nuclear nonproliferation of the Russian Federation (R.F.) Ministry of Foreign Affairs, Ministry of Atomic Energy (Minatom R.F.) and Ministry of

Economic Development and Trade participated in the study and development of this report (Attachment 1).

It should be pointed out that all participants of the Project serve as independent experts in nuclear nonproliferation for the purpose of this study. As a consequence, their viewpoints as stated in the report may not necessarily coincide with official positions of their parent ministries or organizations.

One should proceed from the fact that the fundamental positions of the U.S. and Russia on nuclear nonproliferation coincide. The U.S., as well as Russia, possess by far the largest arsenals of nuclear weapons and fully realize the huge potential hazards of nuclear proliferation, fraught with making it more difficult to control the process by international agencies, and with higher chances for countries with totalitarian and unpredictable political systems to acquire "nuclear" status. Realizing the need to ensure their own national security and maintain international stability, Russia and the U.S. are equally interested in keeping and consolidating the world nuclear nonproliferation system.

Despite many positive and encouraging results in the U.S.-Russian cooperation on nuclear nonproliferation, a variety of problems and impediments have emerged, which reduce significantly the efficiency of joint efforts of both countries focused on the ultimate goal. There are different causes of these impediments to cooperation, which result from political, legal, technical, managerial, bureaucratic, structural, psychological and other issues.

The Project is aimed at identifying and analyzing the existing impediments and complications to the whole complex of the U.S.-Russian cooperation on nuclear nonproliferation and elaborating joint recommendations to overcome or mitigate them to be forwarded to the Presidents of the U.S. and Russian Academies.

Despite the obvious importance of the problem under consideration, so far it has not been the subject of special analysis and research. Thus, the report is actually one of the first attempts at a systematic examination of such an important problem.
The authors fully realize how complex and interrelated the causes of emerging difficulties and impediments to cooperation are, and they are quite aware of the fact that no single remedy will be able to solve these problems.

At the same time it seems quite possible and useful to develop and propose a set of recommendations and considerations as well as specific actions and measures based on a comprehensive analysis of the whole problem to be used by governing bodies as an adequate framework for choosing optimal lines of work and for making decisions.

The first joint working meeting of the Project participants took place in May 2003 in Moscow and addressed the Project goals, contents, milestones and expected results (Attachment 2). It was agreed that in compliance with basic provisions of this document both sides would carry out independent research and draw up their own versions of a joint report on overcoming impediments to the bilateral U.S.-Russian cooperation on nuclear nonproliferation and would submit the documents for discussions at the next working meeting in Vienna (September 2003).

The present report is an interim Russian version of the future joint U.S.-Russian Academies report. It comprises the results of the analysis of the impediments and problems to the U.S.-Russian bilateral cooperation on nuclear nonproliferation based, largely, on relevant programs in which the Russian participants of the Project, as well as their departments and agencies, were and/or are involved.

Based on the results of the U.S. and Russian interim reports and their discussions in Vienna, further research will be carried out in order to develop and release a joint Final Project report tentatively in January 2004.

1. Nuclear Proliferation Threats

It is believed that in the present-day world nuclear weapons serve as deterrents, a sort of the "Sword of Damocles," that would be an inevitable punishment for a potential aggressor. However, nuclear weapons by their very nature have huge destructive power and the many other deadly effects inherent in weapons of mass destruction. In case of uncontrolled nuclear proliferation there is a potential threat to the established system of maintaining international stability. Therefore, the responsibility of the nuclear-weapon countries (the so-called "Nuclear Club" comprising, among other countries, the U.S. and Russia) for international stability is extremely high.

On a very general level, factors that may encourage a non-nuclear country to acquire a nuclear weapon, are as follows:

i. General status of the collective security system (the UN) and the efficiency of the international safeguards to ensure the security of a given country as regards any potential aggressor. However, this first-priority challenge goes beyond the scope of this study.

ii. Fulfillment by Nuclear Club countries of their commitments within the framework of the international nuclear nonproliferation regime concerning, first and foremost, the reduction of their nuclear arsenals to the minimum acceptable and sufficient level. This problem is rooted in the cold war, as a relic of the arms race, when nuclear countries (and first of all, the U.S. and Russia) fabricated and accumulated nuclear weapons in such quantities that their destructive potential was many times over the above level.

Fundamental obligations of the U.S. and Russia on reducing their nuclear arsenals were stated in the Treaty on the Reduction and Limitation of Strategic Offensive Arms (START-I, 1991) and in the Treaty on the Reduction of Strategic Offensive Potentials (SOP, ratified by the sides in 2003). Among the U.S.-Russian projects dealing with the problem under consideration, the following ones should be singled out:

- Dilution of Russian Highly Enriched Uranium (HEU) into Low Enriched Uranium (LEU) and shipping it to the U.S. to fabricate fuel for commercial nuclear reactors (HEU-LEU Agreement of 1993)

- ❖ Dismantlement of decommissioned Russian nuclear-powered submarines and ships (Agreement on Cooperation in the Elimination of Strategic Offensive Arms (SOAE), 1993)
- ❖ Conversion of plutonium-production reactors in Russia (U.S.-Russian Plutonium Production Reactor Agreement (PPRA) of 1997[15])
- ❖ Disposition of surplus weapons-grade plutonium, which is no longer needed for defense purposes in the U.S. and Russia (Agreements of 1998 and 2000)

iii. The present-day technologies of using nuclear power for peaceful purposes (including the nuclear power industry, research reactors, and power reactor facilities of nuclear submarines and surface vessels) have the following peculiarities: most of the associated nuclear fuel cycle stages are potentially vulnerable (to a variable degree) from the viewpoint of nonproliferation of nuclear materials, which could be used to fabricate nuclear weapons. These are:

- ➢ Uranium enrichment
- ➢ Nuclear fuel fabrication
- ➢ Power generation
- ➢ Interim storage of Spent Nuclear Fuel (SNF) prior to its ultimate disposal or reprocessing
- ➢ SNF reprocessing with extraction of power-grade plutonium
- ➢ Storage of extracted plutonium
- ➢ Shipping of fresh or spent nuclear fuel.

So far this vulnerability has been compensated to a considerable extent by the IAEA international safeguards system and by a set of safeguards arrangements and activities at the national and regional levels.

Unfortunately, the current IAEA safeguards are mainly based on inspections, which, in case of a global growth of nuclear power, may become ineffective and excessively expensive. To ensure long-term sustainable development of the world community, nuclear power in the future will have to resolve the problem related to the risk of indirect nuclear proliferation (i.e., due to the use of nuclear energy for peaceful purposes) by the development and large-scale deployment of advanced and innovative nuclear energy technologies capable of ensuring proliferation resistance by an optimum combination of predominantly intrinsic features (technologies and materials) and extrinsic measures (IAEA safeguards, nuclear material protection, control and accounting, export control). When considering extrinsic measures (i.e., IAEA safeguards), use of permanent instrumental monitoring systems to eliminate unauthorized modifications in reactors or fuel cycle facilities will be, evidently, necessary as well.

In this context the following initiatives and related opportunities deem important:

- ❑ Bilateral U.S.-Russian cooperation on advanced nuclear reactors and fuel cycles (Moscow Summit of the U.S. and Russian Presidents in May, 2002), and

[15] The 1994 Agreement has not been ratified, and therefore has not come into effect. Presently the 1997 Agreement is in force.

- Multilateral cooperation of the U.S. and Russia within the framework of the international projects initiated by these countries in the year 2000 on the development of advanced "Generation IV" reactors (GIF) and the IAEA project on innovative nuclear reactors and fuel cycles (INPRO), respectively.

2. Scope, Results and Good Practices of the U.S.-Russian Cooperation on Nuclear Nonproliferation and Related Areas

Besides problems and impediments emerging in U.S.-Russian cooperation on nuclear nonproliferation, useful experience has been gained, and many specific results obtained. Prior to the analysis of problems and impediments to bilateral cooperation, it would be worthwhile to summarize the experience and good practices that could be used in the development of recommendations on overcoming or mitigation of the impediments.

When analyzing the achievements, a consideration of some other bilateral U.S.-Russian cooperation projects related to nuclear nonproliferation (e.g., in the area of improving nuclear safety at nuclear power plants (NPPs)) is deemed useful for learning lessons in nuclear nonproliferation projects.

2.1 Cooperative Threat Reduction Program (Nunn-Lugar Program)

An umbrella Agreement on the safe and secure transportation, storage and destruction of weapons and the prevention of weapons proliferation (also known as the Cooperative Threat Reduction Program (CTR) Program), signed by the Presidents of the U.S. and Russia in June 1992, provided a framework for implementation of the START I Treaty, initiated large-scale cooperation on this subject, and was especially important for strengthening strategic stability. The initiative focused on Russia and some other former Soviet Union countries, and was initiated on the U.S. side by U.S. Senators Nunn and Lugar; for this reason the Agreement is often called the Nunn-Lugar program.

As an extension of the intergovernmental umbrella Agreement, about twenty executive agreements have been signed covering a wide range of bilateral interactions, such as elimination of strategic offensive arms, safety improvements of nuclear weapons transportation and storage, disposal of chemical weapons stocks, improvement of the nuclear material protection, control and accounting system, construction of a storage facility for surplus weapons-grade fissionable materials, and shutdown of weapons-grade plutonium production reactors.

When summing up the CTR program implementation results over more than 10 years, it could be concluded that the Agreement made and still makes it possible to address successfully in a relatively short time such important challenges as:

- Ensuring safe shipping to Russia of nuclear ammunition [warheads] from the Ukraine, Byelorussia and Kazakhstan;
- Upgrading considerably the safety level in storing both nuclear weapons at R.F. Ministry of Defense facilities and nuclear submarine SNF at the Russian Navy facilities;

- Modernizing the systems of nuclear material protection, control and accounting at more than 25 Russian nuclear facilities;
- Constructing a storage facility for surplus weapons-grade fissionable materials (Cheliabinsk, commissioning due date for the first phase the beginning of the year 2004);
- Building power-generating capacities using fossil fuel to replace those of weapons-grade plutonium producing reactors to be shut down in Tomsk-7 and Krasnojarsk-26 (2005-2006).

Both sides have been continuously working to enhance the efficiency of the CTR program implementation. It should be especially stressed that the decision of the U.S. Government on active involvement of Russian subcontractors and wide use of Russian special purpose equipment contributed significantly to accelerating the progress and improving the cost-effectiveness of the CTR program.

The issue of increasing the share of funds allocated by the U.S. Congress to be received by Russia has been gradually taken care of. At the initial stages of cooperation over 50% of the funds were forwarded to reimburse the costs incurred by U.S. subcontractors and for overhead charges for the U.S. program managers. A mechanism of financial audit of the program costs within contracts with enterprises has been agreed upon and is functioning sufficiently well.

In 1992-1993, in the context of the CTR Agreement, supplementary agreements were signed. To date, some of them have been already completed, while others are still under implementation. Special shipping casks for fissionable materials, equipment to mitigate the consequences of emergency situations and related personnel training programs, and protective coatings and sets to reequip railcars and security cars have been supplied to Russia. Both Russian and U.S. specialists designed and began to construct a safe and reliable storage facility for fissionable materials produced in the process of nuclear weapons elimination.

In 1995 the U.S. President stated that 200 tonnes of fissionable materials were to be decommissioned from the U.S. nuclear arsenal and never used in future to fabricate weapons.

At the 41st session of the IAEA General Conference (1997) a statement of the R.F. President was made public that up to 500 tonnes of HEU and 50 tonnes of plutonium released during the nuclear disarmament process would be withdrawn step-by-step from the Russian defense nuclear programs.

In 2000 an Intergovernmental U.S.-Russian Agreement on disposition of surplus weapons-grade plutonium was signed, according to which each of the sides shall convert 34 tonnes of weapons-grade plutonium into mixed oxide uranium-plutonium (MOX) fuel for NPPs.

The weapons elimination process caused the need to solve tasks related to safe and secure storage of nuclear materials, disposition of surplus fissionable materials, and restructuring and conversion of the Russian nuclear weapons industries. Under conditions of a terrorism threat, both sides have agreed to initiate work aimed at ensuring physical protection of all types of radiation sources.

Between 1997 and 2000, within the framework of the U.S.-Russian plutonium production reactors Agreement, specialists of R.F. Minatom performed design work on converting three plutonium production uranium-graphite reactors operating at the Siberian Chemical Combine (SCC) and the Mining Chemical Combine (MCC). The reactors supply the towns of Seversk and Zheleznogorsk with heat and electricity as by-products. However, the chosen reactor conversion strategy has proved rather expensive and technically complicated. Eventually, a decision was made to construct heat and power generating plants using organic fuel in both Seversk and Zheleznogorsk. After the commissioning of these plants the obsolete plutonium production reactors will be shut down for good.

In addition to the CTR and related agreements, some other important bilateral accords have been concluded to strengthen the nuclear nonproliferation regime.

Since 1993, the HEU-LEU Agreement providing for dilution during 20 years of 500 tonnes of Russian HEU into LEU and shipping of the latter to the U.S. to fabricate fuel for commercial nuclear reactors has been successfully implemented. As of 2003 more than 190 tonnes of HEU have been diluted and 5,700 tonnes of LEU shipped to the U.S., which secured power generation at U.S. nuclear power plants amounting up to 10% of the annual electricity production in the U.S. (i.e., about 50% of nuclear electricity). In its turn, Russia received about $3.7 billion of revenues to be spent to upgrade the safety level of the nuclear power industry, “convert nuclear cities”, and conduct research and development work on advanced nuclear reactors and fuel cycles.

During 1998 through 2003 an Agreement on cooperation to realize the "Nuclear Cities Initiative" was in force, focused on the creation of new work for the personnel made redundant from nuclear defense programs (the Agreement expires in September 2003).

2.2. Nuclear Submarine Dismantlement

The resolution of the House of Representatives of the U.S. Congress initiated by Senators Nunn and Lugar contained a directive to the U.S. Department of Defense (DOD) to assist the former Soviet Union countries in the decommissioning of weapons of mass destruction. As a result, on the 26th of August 1993 the U.S. DOD and the R.F. Committee for Defense Industries signed the SOAE Agreement. Due to changes in the R.F. executive authority structure, the Russian commitments related to the Agreement’s implementation were transferred to Rosaviakosmos. Since dismantlement of nuclear submarines decommissioned from the Russian Navy was implemented by R.F. Minatom, an amendment to the SOAE was signed by both R.F. Rosaviakosmos and the U.S. DOD in 2003. The history of the Russian nuclear submarine decommissioning within the framework of the Nunn-Lugar Program is summarized below (Figure 1).

The decommissioning of nuclear submarines is a large-scale political, engineering and environmental problem involving a multitude of facilities and a large complex of interrelated technologies. Among engineering operations related to the decommissioning, those dealing with SNF unloading, storage, transportation and reprocessing (i.e., directly related to nuclear nonproliferation) are the most sophisticated and important.

The start of work on the decommissioning of Russian nuclear submarines coincided with political changes in Russia, accompanied with a severe economic recession. As a consequence, some important decisions were based on specific considerations of the moment and were made under severe financial constraints.

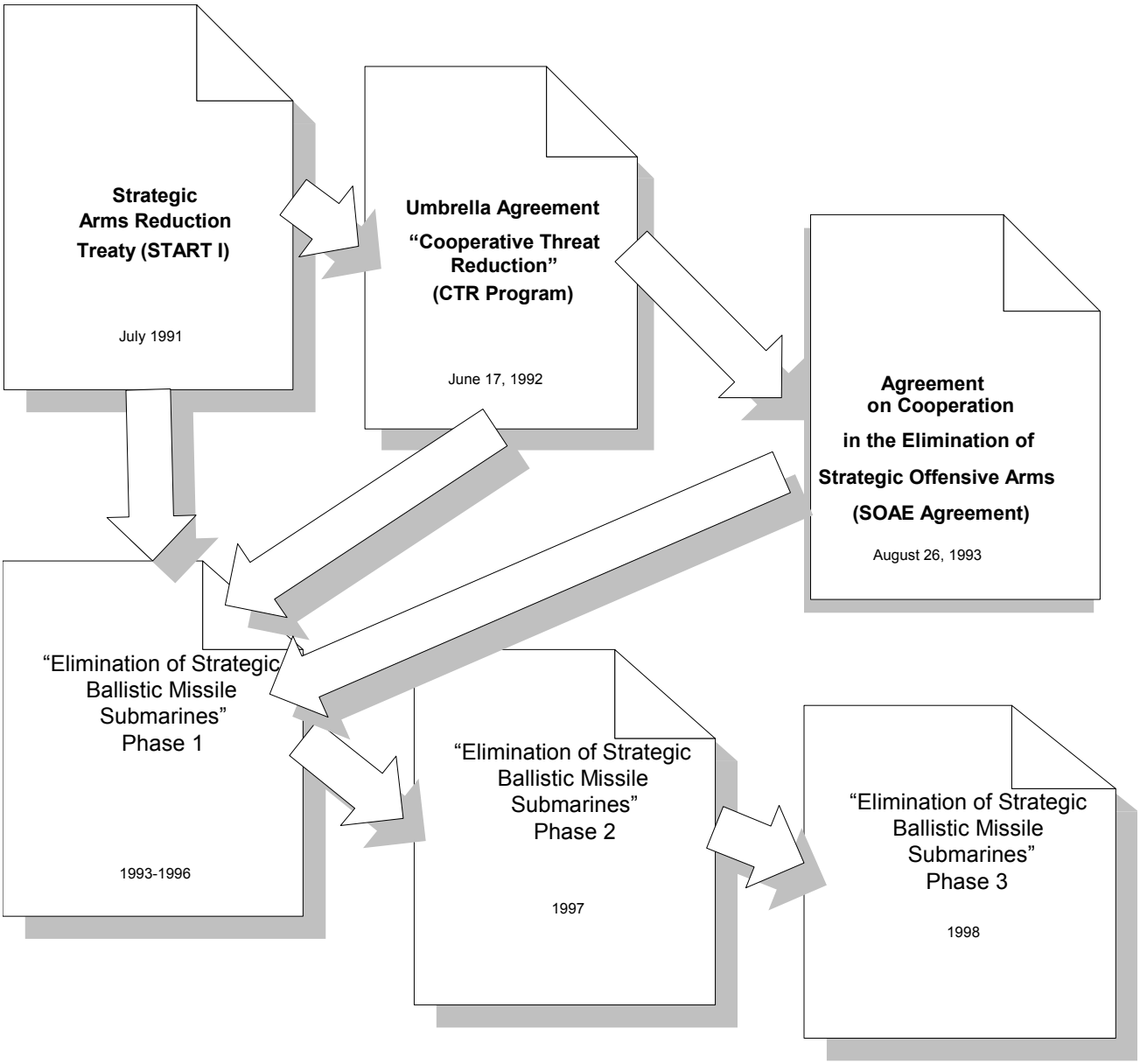
In compliance with the program during 1996-1999 some specialized equipment critical for the program implementation was supplied, including cutting equipment (e.g., an automatic guillotine to cut submarine hulls into sections) and specialized cutting tools, cable reprocessing facilities, and other specialized equipment.

Under the U.S. Government financial support within the program framework a radioactive waste treatment complex was designed and commissioned in October 2000, and a land-based facility for interim storage of SNF unloaded from the decommissioned nuclear submarines was put into operation at the end of 2002.

Under this program the U.S. Government is also funding work on the dismantling of strategic ballistic missile submarines (SSBNs). For example, the dismantlement of five "Delta"-class nuclear submarines at the state enterprise “Zvezdochka" was financed in 1998 through 2000.

It is worthy of notice that the U.S. participates only in the dismantling of the SSBNs and, despite appeals from the Russian government, allocates no funds to dismantle Russian multi-purpose nuclear submarines, the number of which substantially exceeds that of the SSBNs. Such considerations are based on the fact that in the latter case the U.S. security is not affected. At the same time the U.S. side has no objections to using the infrastructure built to dismantle the SSBNs for dismantling the multi-purpose submarines.

Figure 1. Phases of the Russian Nuclear Submarine Dismantling Program (within the Nunn-Lugar Program)



2.3. Export Control

Export Control is another important cooperative program between the U.S. Department of Energy (DOE) and the R.F. Minatom. This program has been implemented within the framework of both the bilateral U.S.-Russian cooperation on nuclear nonproliferation and the Protocol of Intent on joint export control activities of 1997 between R.F. Minatom Department of international and external economic cooperation and the U.S. DOE.

Within the program a wide range of subjects has been addressed, which include, but are not limited to:

- organization of workshops on export control for R.F. Minatom enterprises,
- development of training documentation for training courses on nuclear export control for Minatom enterprises,
- development of training documentation for training courses on nuclear export control for the educational system at the R.F. State Customs Committee, and
- development of appropriate tools to support export control activities (handbooks, databases, glossaries, dictionaries, computer document management and control systems).

In 1997 two R.F. Minatom export control laboratories were established at the State Unitary Enterprise "Physics and Power Institute" (IPPE) and VNIITF. These laboratories perform extensive research for R.F. Minatom, do training and work on export control at the R.F. Minatom enterprises, and review export contracts to identify science-intensive export products.

Within the U.S.-Russian cooperation program these laboratories fulfilled the following tasks:

- During 1997-2003 the two laboratories held 25 training and methods courses on export control and nuclear nonproliferation related issues (among them, 16 industry-wide and 9 courses for specialists of individual enterprises). About 400 specialists from 135 R.F. Minatom enterprises as well as from other ministries involved in inter-company export control programs at their enterprises attended the industry-wide training courses. In addition, about 450 scientists, engineers and chief executives responsible for export contracts and International Scientific & Technical Center (ISTC) projects took part in the on-site courses.
- In 1998 specialists of the IPPE laboratory with participation of VNIITF developed the first draft of “The Manual for Nuclear Export Control.” In the course of the following years "The Manual" was regularly revised and supplemented. In 2003 the 6th edition of "The Manual" was issued.
- Three training courses on nuclear export control were developed jointly with the VNIITF laboratory for basic and advanced training of customs personnel.

The two laboratories also developed:

- "Nuclear Export Control Desk Reference Book" for R.F. Minatom enterprises (based on "The Manual"),
- Generic instruction manual on inter-company export control at enterprises,
- Leaflet for the IPPE export control laboratory on the IPPE web site,
- English-Russian/Russian-English Glossary and Dictionary-Term Reference Book on export control,
- "Electronic document management and control concept" to support the R.F. Minatom export control system, and
- Reference Database on the Internet Information Resources on export control.

This list of activities conducted by the laboratories during 7 years is, obviously, far from being complete.

To ensure transparency of funding and avoid duplication of work performed by the laboratories, working meetings have been held twice a year, which addressed the progress of work within the concluded contracts, their results, the need for work extension, and prospects for further cooperation. Activities that do not have confirmed interest for either of the sides are not considered eligible for funding.

Taking into consideration political aspects of the export control cooperation, the R.F. Minatom is motivated to ensure the involvement of representatives of all R.F. ministries that bear responsibility for the functioning of the export control system in Russia. Such an approach makes it possible to avoid potential bureaucratic impediments to the practical implementation of the cooperation challenges. It is believed that the issues of both export control and nuclear nonproliferation will remain one of most important lines in the U.S.-Russian collaboration in the near future.

2.4. International Nuclear Safety Program

The International Nuclear Safety Program (INSP), though not focused directly on nuclear nonproliferation, is closely related to this subject. It demonstrates a good example of U.S.-Russian cooperation remarkable for its transparency and free access to information on the tasks (including funding) and progress of the whole program, as well as on its specific projects. The INSP program was initiated shortly after the Chernobyl accident and was intended to assist Russia in improving safety of its operating NPPs. By now the program has been largely completed. However, the experience gained appears to be very useful for other areas in the U.S.-Russian cooperation, including nuclear nonproliferation.

Initially information on the progress of the program's implementation within individual NPP safety improvement areas could be obtained from quarterly and annual reports put together by the U.S. DOE. Later on, as the number of joint projects increased, they were classified by subject, supplied with a detailed description and an identification number to be used when searching for information on an individual project on the INSP web site. Information on project progress was routinely placed in the Internet and, in addition, forwarded in a paper form to NPPs and organizations involved in the project, as well as to R.F. Minatom managers at different levels (from division head to deputy minister) involved in the INSP implementation and the solution of emerging problems.

Project information included description of project goals, due dates (start date and scheduled completion date), obligations of the sides, description of planned activities, names of executive managers from the U.S. DOE and the U.S. company involved in the project, and names of managers from Russian NPPs or enterprises involved into the project with their contact phones and email addresses. This information allowed for easy contact of any project manager in the shortest possible time to resolve the issues.

The funding chart demonstrated not only a total amount allocated for every project in a given fiscal year, but also what had been already spent on the project since its start, as well as an amount needed to complete the project assessed by the project managers. Such transparency made the distribution of funds much easier and allowed for making decisions on funding support of individual projects for the coming fiscal year or vice versa, and for refusal of further funding of some projects in favor of new, more important projects.

The INSP program in Russia, as well as many other cooperative programs, was coordinated by the Joint Coordinating Committee (JCC INSP) comprising managers of the U.S. DOE, the R.F. Minatom, and other principal institutions involved in the program. Routinely, managers of individual INSP projects on both sides discussed the project needs, problems, and progress on their own level. For this reason, successful implementation of INSP projects often depended on mutual relations between the U.S. and Russian managers and on their readiness to make compromises as well. However, all decisions on the funding of INSP projects were made by the JCC INSP.

Twice a year the identification of projects to be funded during the next fiscal year was on the agenda of JCC INSP meetings. For every JCC meeting project managers prepared information on the project's progress, problems emerging during their implementation that could not be resolved at their managerial level, and justification for additional funding if the relevant project needed money for the next fiscal year. Not only the total amount of funds to be allocated for the next fiscal year was approved at JCC INSP meetings, but also the distribution of funds among individual projects according to established priorities and effective use of already allocated funds.

2.5. Joint Verification Experiment

Cooperation between R.F. Nuclear Centers and U.S. National Laboratories began in the late 1980s. Joint experiments on the verification of nuclear tests was the first large project on this subject. Within the project framework, the U.S.S.R. experts measured a nuclear explosion's power at the Nevada test site, while the U.S. scientists performed measurements at the Semipalatinsk test site. It should be especially stressed that, when implementing this project, both sides had to overcome many objective and subjective impediments, such as:

- Need to protect sensitive information concerning fundamental national security issues,
- Mutual distrust and even suspicion,
- Different technical solutions of the methods used to perform nuclear tests and measure a nuclear explosion's power,
- Necessity for urgent solution of access control issues related to the arrival of large groups of technical experts of the other side, and
- Examination of sophisticated equipment for installed intelligence devices.

Successfully overcoming these impediments was to a large extent due to thorough analysis of the issues at the U.S.-U.S.S.R. negotiations in Geneva with the participation of diplomats and representatives of leading research institutions of both countries. As a result of the Geneva

negotiations, an inter-governmental agreement addressing all principal problems was drawn up and concluded.

There was another factor, which contributed considerably to the success of these activities: high-level managers empowered to resolve urgent problems headed the teams of both the U.S. and the U.S.S.R. experts. Such important joint work brought the experts of both countries closer together. The high professional level of the involved specialists inspired respect and affection that ensured their professional and personal contacts in the following years. The atmosphere developed between the two groups of experts of both countries at the Nevada test site and at the Semipalatinsk test site could be a good example to emulate in cooperation on other subjects. Joint detailed discussions of the experiments' results were also useful. Thus, the joint verification experiment was a major step toward strengthening confidence between our countries.

2.6. International Scientific and Technology Center

The idea of establishing an International Scientific & Technology Center (ISTC) emerged in the course of the visit of James Baker, the U.S. Secretary of State, to Snezhinsk (VNIITF). The major purpose of the ISTC is to motivate Russian scientists and experts on the weapons of mass destruction to continue their professional activities in Russia and prevent them from leaving to "problem" (rogue) countries. Thus, the ISTC became an appreciable source of support for such scientists in the hardest years of restructuring Russia.

The scope of activities and the number of Russian scientists involved in ISTC projects has no equal. In the last 10 years the ISTC funded projects to the total amount of about $500 million, which involved over 51 thousand scientists at 700 research institutes in Russia, Byelorussia, Armenia, Georgia, Kazakhstan and Kirghizia.

To a large extent the success of the ISTC activities was due to the fact that the following key issues were agreed at the preliminary stage:

- Requirements for project proposals and format of their presentation
- Mechanism of coordination with Russian governmental bodies
- Project review procedure: expert appraisal at the Scientific Advisory Board and decision-making by the funding parties at the Board of Governors
- Issues of audit and access to Russian institutions
- Reimbursement of (exemption from) taxes and customs duties
- Payment of project grants for their participants
- Operational support of the ISTC projects by its Executive Directorate.

All participating parties formalized the above arrangements as an international agreement.

2.7. Transparent Dismantlement of Nuclear Warheads

During preparation for a Strategic Arms Reduction Treaty (START III) and in compliance with the Joint Statement of the U.S. and Russian Presidents (Helsinki, March 1997), multi-purpose studies were carried out at weapons laboratories of the U.S. and Russia in 1996 through 1998

focused on potential approaches, technological and organizational measures, and techniques to ensure transparent dismantlement of nuclear warheads under the conditions of future arms reductions.

The research performed at VNIITF gave an appreciable positive impetus to the better understanding of the issues and of the potential measures capable of enhancing confidence on both sides of the nuclear warheads elimination issues. The following basic proposals were drawn up:

- a concept of controlled transparent dismantlement of nuclear warheads,
- technical approaches to confirm authenticity of dismantled warheads and the irreversibility of their elimination,
- potential scenarios of transparent dismantlement, and
- experimental control methods.

These activities were mainly performed within contracts between VNIITF and the U.S. national laboratories. The development and demonstration of technologies to be potentially used to ensure transparent dismantlement of nuclear warheads were one of the results of this work:

- Radiation certification
- Detection of explosives (because management of explosives necessitates a very careful treatment, instrumental methods were proposed to identify them within the structures to be dismantled)
- Elimination of nuclear warhead cases
- Elimination of explosive substance components.

2.8. Nuclear Material Protection, Control and Accounting

Upgrading and improving the system of nuclear materials protection, control and accounting (MPC&A) became one of the most important areas of U.S.-Russian cooperation, both on nuclear nonproliferation and on counteracting unauthorized diversion of nuclear material. Such cooperation made it possible to:

- Construct new nuclear material storage facilities at R.F. Minatom enterprises and upgrade the available ones,
- Develop MPC&A related standards and regulations,
- Develop a federal information system for nuclear material control and accounting,
- Upgrade instrumentation and methodological support of nuclear material control and accounting,
- Improve radio communication for ensuring physical protection of facilities with dangerous nuclear material,
- Improve safety when shipping nuclear materials,
- Institute departmental security training centers,
- Equip R.F. Minatom enterprise security units,
- Establish departmental supervision at R.F. Minatom enterprises,

- Maintain operability of MPC&A related systems and equipment.

The U.S.-Russian cooperation on this subject involving nuclear facilities of the R.F. Minatom and the R.F. Ministry of Defense (MOD) has been carried out for about 10 years and is characterized by high efficiency and appreciable practical results.

The security level of nuclear materials was considerably improved at more than 25 Minatom facilities involving tens of tons of nuclear materials (including fissionable weapons grade materials). Among such facilities are Federal Nuclear Center "Arzamas-16" (Sarov) and "Cheliabinsk-70" (VNIITF, Snezhinsk), IPPE (Obninsk) and RRC "Kurchatov Institute."

A long-term plan of joint activities at 10 other Russian nuclear facilities was agreed. During implementation of projects focused on equipping the R.F. MOD facilities with up-to-date physical protection systems the following equipment has been supplied: over 120 units of perimeter protection systems, 400 sets of computer equipment, devices to detect alcohol and drugs in human bodies, and a training complex for the maintenance personnel.

Storage facilities for non-irradiated cores of nuclear submarine reactors equipped with up-to-date MPC&A systems were built for the Arctic and Pacific Navy; storage facilities for both non-irradiated and spent nuclear fuel were equipped with similar systems.

An integrated pilot MPC&A system for the multi-purpose experimental pulse nuclear reactor facility housing tens of kilograms of nuclear weapons-grade materials was developed in 1995 through 2002 at VNIITF in Snezhinsk. For these purposes the U.S. granted an equivalent of $13.1 million as financial and technical support.

These activities were based on the U.S.-Russian CTR Agreement of June 17, 1992; the Protocol of June 15-16, 1999; and the U.S. DOE and R.F. Minatom Protocol of April 25, 2002 addressing the work at VNIITF. According to the latest Protocol, $38 million is to be allocated in 2002-2006 for the continuation and further development of the work.

A special U.S. DOE working group comprising representatives of six U.S. national laboratories served as points of contact with the U.S. labs. The contents of every working stage, labor days, equipment composition and costs were discussed and coordinated at working meetings between the U.S. DOE working group and VNIITF specialists. The working group members controlled the quality of work and the use of funds.

2.9. Inter-Laboratory Cooperation Programs

Relations between Russian Nuclear Centers and the U.S. national labs were not always unclouded. In this context an initiative of S. Hecker, the former Los-Alamos National Laboratory (LANL) Director, to conclude so-called "umbrella" cooperative agreements was of major importance. To date VNIITF has umbrella agreements with LANL, Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL).

Such umbrella agreements do not require stipulating general conditions of interactions within every contract as regards specific activities and, thus, facilitate the contract consent processes both at the U.S. DOE and the R.F. Minatom.

Unfortunately, these interactions have been so far mainly a one-way street, because finances have been forwarded to Russia, whereas the scientific information has gone to the U.S. Currently more and more possibilities emerge to establish a balanced cooperation.

3. Impediments to Cooperation Between the U.S. and Russia on Nuclear Nonproliferation

Along with positive results, the multi-year experience of the U.S.-Russian interactions on nuclear nonproliferation revealed a number of "weak points" and impediments hindering further development of the U.S.-Russian collaboration on the subject, some of them a matter of principle. The analysis undertaken in the present research made it possible to classify these problems as follows:

- High-level political issues
- Legal issues
- Scientific and technical cooperation
- Program management issues
- Interactions at different levels
- Legacy of the cold war mentality
- Funding issues

3.1. High-Level Political Issues

3.1.1. Practices of the U.S. Congress to Link the Funding of CTR Projects to Unrelated Political Conditions.

As it is explained by the U.S. side, such linkage results from peculiarities of the U.S. legislation, according to which the U.S. Congress can take yearly funding decisions related to the CTR program implementation only once the U.S. President confirms the fulfillment of the R.F. obligations on international agreements.

As it is known, the lack of convincing evidence that Russia is fulfilling the Chemical Weapons Convention was the pretext to block CTR program funding in 2002. Later on this decision was suspended but only for a limited time.

Quite a similar politically motivated situation is arising regarding the new U.S.-Russian Agreement on the peaceful use of nuclear energy. The U.S. is not willing to take such a step until Russia "freezes" its collaboration with Iran in the nuclear area, which, in the U.S. opinion, could contribute to the build-up of a military nuclear program in that country.

Russia, as it was repeatedly stated, considers the U.S. concerns subjective and unjustified and has given multiple clarifications on this subject. Realizing that the U.S.-Russian cooperative

programs on nuclear disarmament and nonproliferation are of crucial importance for further strengthening of strategic stability and, therefore, meet the vital interests of both countries, linkage of their implementation to any political condition seems counterproductive.

3.1.2. The U.S. Dissatisfaction with the Access Control of U.S. Representatives to Classified Russian Nuclear Sites.

When solving the access-related issues, both sides are guided by their own legislation in force. Despite some restrictions (e.g., a special request notification deadline of 45 days preceding any visit to a Russian classified site), within the U.S.-Russian cooperative programs such access is granted on the basis of yearly-approved lists of the U.S. delegates, which are updated once every six months. Multi-entry visas to Russia for U.S. specialists involved in the R.F. Minatom program implementation are granted by Russia on a limited scale because in most cases such work involves visiting sensitive facilities. To mitigate the entry-visa problem, at present the R.F. Minatom confers double-entry visas to Russia for the U.S. specialists for a period of three months.

At the same time the Russian side fully realizes that in order to attract U.S. private investments (to fund, e.g., the project of “converting” classified nuclear towns in Russia), the issue of access control for the U.S. partners necessitates a more general solution.

It seems that in future a possible solution of the issue could be a removal of concerned production units of the classified facility to be converted from the site’s jurisdiction. The nuclear center "Arzamas-16" (town of Sarov) has had some good experience on this subject related to the joint production with an American company of an artificial kidney machine at the former defense plant "Avangard" (which used to specialize in assembling nuclear warheads).

In its turn, considerable toughening of the U.S. immigration policy after the September 11, 2001 events also resulted in an increasingly complicated procedure of granting the U.S. entry visas to Russian citizens, including specialists involved in the implementation of joint nuclear nonproliferation programs. Having an understanding of the objective reasons for such measures, one has to confess that such a situation cannot help affecting negatively the quality and due dates of program implementation, and needs to be corrected at a high level (i.e., at least at the level of foreign policy departments).

The recently established practice of interviewing Russian citizens at the U.S. Consulate in Moscow prior to granting a U.S. entry visa is also worthy of addressing. Today the U.S. side requires personal attendance at such interviews by every Russian citizen who applies for a U.S. visa. This leads, on the one hand, to additional expenses for interviewees (travel to Moscow, lodging, etc.) and, on the other, results in unnecessary tension due to the unbalanced visa requirements of the sides. Given the arrangement of not interviewing project participants with diplomatic or governmental (business) passports, the U.S. side recently began replacing passports of their specialists with the “right” ones exempting them from the interviews in the Russian Consulate.

It is believed that in this particular case the visa application procedures for both U.S. and Russian specialists could be simplified if they are well-known persons (e.g., included in some pre-agreed lists) involved in the implementation of known (intergovernmental and interdepartmental) projects.

3.1.3. Both the U.S. and Russia are nuclear countries with their own national defense interests, in particular, with their own plans for use of nuclear technologies aimed at ensuring their national security.

Within the CTR cooperative programs it is not a rarity that information on "sensitive" subjects requested by one side cannot be submitted by the other side without affecting its national security interests. Both the requests for such information and the refusals to submit it exert negative effects on maintaining and strengthening confidence between the two partners.

To avoid such situations, it is recommended that (international) requirements (standards) be developed and introduced for nuclear nonproliferation during joint research involving nuclear facilities of nuclear countries sensitive for the countries' national security. Such requirements could be developed by any two (or more) nuclear countries interested in such cooperation in order to reduce the nuclear proliferation threat. There is no question that these requirements should fully comply with the NPT and international law as a whole, as well as with national legislation, standards, and regulations of the involved countries.

Among other things, such requirements could comprise an agreed classification of nuclear facilities of collaborating countries related to their national security and sensitive to nuclear proliferation, and, therefore, included in the CTR programs. They could also specify comprehensive symmetrical data on such facilities to be submitted by one nuclear country to the other(s) when performing cooperative programs on this subject.

3.1.4. The U.S. and Russia are nuclear countries with their own national economic interests, in particular in the area of commercial peaceful use of nuclear technologies in the non-nuclear countries.

The lack of internationally accepted, explicit, and comprehensive requirements for the non-nuclear counties developing peaceful uses of nuclear energy or having plans for their development provides a possibility for the nuclear countries to put forward claims, not always justified, and double (or even triple) standards.

The above reveals the need of ensuring a fair competition for nuclear technologies developed by the nuclear countries, including the U.S. and Russia, in the markets of non-nuclear countries. The competition should proceed in conformity with international rules, which should exclude any possibility for NPT provisions to be used as impediments for penetration of a peaceful nuclear technology developed by a competitor-country into a non-nuclear country.

The economic, scientific, and engineering cooperation program between Russia and Iran to assist Iran in completing and bringing into operation the nuclear power plant in Bushehr is an example of such collaboration. It is joint Russian and Iranian opinion that during program implementation

both sides totally fulfill their international obligations, including those on nuclear nonproliferation. In response to appeals of the international community Iran began consultations with the IAEA on signing the Additional Protocol to the Agreement on the IAEA nuclear safeguards. This Protocol would enlarge considerably the IAEA's powers to require disclosing undeclared nuclear activities. (Having been signed by 80 countries, the Protocol has already entered into force in 40 countries.)

However, in the U.S. view Iran does not need to develop a national nuclear industry because of abundance of organic fuel resources. In its turn Iran declares that the country is willing to use its natural resources at its own discretion to ensure national (energy) security. For this reason Iran is planning to use natural fossil fuel resources with maximum effectiveness to ensure growth of its national economy by different means, including export sales. The U.S. reproaches Iran for insufficient openness and, in this context, keeps alleging that the Iranian nuclear program may have a military motive. Under the circumstances, when there is no direct evidence to confirm the implementation of a military-oriented nuclear program in Iran, Russia does not share the U.S. opinion.

To avoid such a situation in the future, it is recommended that international requirements for nuclear nonproliferation in commercial use of nuclear technologies supplied by the nuclear countries to the non-nuclear ones be developed and introduced. Two (or more) nuclear countries interested in commercial promotion of their nuclear technologies to the non-nuclear countries could initiate the development of such requirements. The requirements should fully comply with the NPT and comprise explicit information to be submitted by any nuclear country supplying its nuclear technology to a non-nuclear country or to other nuclear country/countries. The development of such requirements could initiate a long-term transition from an international nonproliferation regime based largely on prohibitive measures (which are known to be most often counterproductive) to a nonproliferation regime encouraging the use of nuclear technologies for peaceful purposes in compliance with the established international rules.

When a country that acquired a nuclear weapon after the NPT had been concluded may not be a party to the Treaty (e.g., Israel, India, and Pakistan) or may withdraw from it (North Korea), the NPT's effectiveness may not live up to expectations. Most likely, an ultimate solution to the nuclear nonproliferation problem may be possible only once possession of nuclear weapons becomes a heavy economic burden outweighing by far the benefits. In other words, instead of closing the entrance doors to the Nuclear Club (which experience tends to demonstrate to be impractical) the admission fee needs to be made exceedingly expensive, therefore rendering the entrance unjustified.

3.1.5. International nuclear nonproliferation requirements for commercial use of nuclear technologies developed by the nuclear countries in the non-nuclear countries, as well as when nuclear states conduct joint studies at facilities sensitive to their national security, could constitute a conceptual foundation for institutionalization of nuclear nonproliferation at a national level.

This can be realized by establishing dedicated high-level nuclear nonproliferation posts to report to the respective Presidents and head a national inter-ministerial Council on nuclear

nonproliferation. The responsibilities of such an official would include coordination of the whole range of issues related to implementation of the U.S.-Russian bilateral projects on nuclear nonproliferation.

It is suggested that a bilateral U.S.-Russian Commission on nuclear nonproliferation be set up to directly coordinate all issues related to implementation of bilateral projects on nuclear nonproliferation, including those of confidentiality and information protection. Based on specific arrangements with agencies involved in the nuclear nonproliferation activities, such a Commission could render administrative and legal support to the organizations in implementing the nonproliferation projects. The Commission could also ensure control over spending of budget funds and submit annual reports to both the U.S. Congress and the R.F. Federal Assembly.

3.2. Legal Issues

As will be seen from the following chapters, the maturity of the legislative basis, the availability of appropriate organizational frameworks and mechanisms to ensure practical application of existing laws, and other legal issues directly affect the implementation of cooperative nuclear nonproliferation programs (as well as those in other areas). The issue is very complicated and of paramount importance, and, therefore, deserves special consideration. Far from pretending to be a comprehensive analysis, an attempt is made to outline specific legal impediments (principally, in the Russian legislation), whose elimination or mitigation would make a significant contribution to further development of U.S.-Russian cooperation on nuclear nonproliferation.

3.2.1. Taxation

So far within the U.S.-Russian cooperation on nuclear nonproliferation programs of economic, scientific and technical assistance, “aid” has prevailed, wherein the U.S. Government acts as a "donor," while Russian federal, regional and local executive bodies, legal entities and individuals act as "recipients."

To enhance the efficiency in the implementation of such assistance the Agreements on cooperation in Russia provide different sorts of privileges for both "donors" and "recipients." Among them are: exemption from or refund of the value added tax (VAT), income tax, and other taxes collected by the federal budget when using funds, equipment, labor and other services within the R.F. territory during the execution of cooperative programs.

The issue is most fully addressed in the 1992 CTR Agreement, according to which "…the U.S., their personnel, contractors and contractors' personnel are completely exempted from any taxes and dues of the R.F. and its bodies in relation to activities in line with the Agreement.” Similar privileges have been ensured in case of export from/import to Russia of any equipment, materials, or services necessary for the CTR Agreement implementation. Moreover, the R.F. or its bodies have been taxing neither equipment nor services purchased by the U.S. or on behalf of the U.S. within the R.F. territory, when implementing the CTR Agreement.

It should be emphasized that, thanks to the clearness of the tax exemption clauses in the CTR Agreement, no serious complications related to the exemption from taxation within the

Agreement framework have ever emerged. Even when it expired in 1999, a Protocol to prolong the CTR program for seven years was signed in June 1999, and since then the Agreement has been used in a provisional manner. However, to make the above privileges completely legal, the Protocol needs ratification by the Russian State Duma.

A set of Russian laws regulate interactions of the cooperating sides with the Russian State authorities, among which the following could be singled out:

- The 1992 Income tax law concerning enterprises and organizations,
- The 1992 Tax law concerning the real estate and other property of enterprises, and
- The 1999 (May 4) Law on the assistance (aid) to the Russian Federation, amendments and additions to be introduced into specific R.F. legal acts on taxes and privileges on the payments to the state out-of-budget funds in relation to the assistance (aid).

The complex of the R.F. laws, Government directives, orders of individual Ministries and Agencies, and the U.S.-Russian Agreements on nuclear nonproliferation as a whole seem to constitute a necessary legislative taxation framework during implementation of the cooperative programs.

The taxation situation was much more complicated with other U.S.-Russian Agreements in this area, wherein the issues of tax exemption were regulated by specific directives of the R.F. Government and orders of specific ministries and agencies.

The situation considerably improved after the coming into force of the above Federal Law № 95 of May 1999 on assistance (aid) to the Russian Federation, which to a large extent brought order to the taxation and tax exemption processes. Key definitions were introduced by the law, such as the (technical) assistance (aid), which makes related means, goods, and services liable to tax exemption.

In keeping with the R.F. Government Order #1046 of September 17, 1999 the registration of technical aid (assistance) programs is performed by the R.F. Ministry for Economic Development and Trade upon submittal (either by the recipient or the donor) of an application to the Commission on International Technical Assistance set up by the R.F. Government. Prior to making a decision on registration, an expert examination of the submitted documents is to be made by the Commission to verify the compliance of any technical assistance project with the national priorities and principal areas in technical assistance.

However, despite some progress made in the tax exemption area after entering into force of the Federal Law № 95 (1999), a number of problems still persist and need further solution:

- Lack of a clear mechanism of the law's execution in the form of special clauses in the Russian Tax Code. More specifically, Part 2 of the Russian Tax Code, which came into effect in 2000, has no clarification on the tax exemption mechanism regarding the participants in programs of scientific and technical assistance (including the U.S.-Russian cooperative programs). Such a situation results in ambiguous interpretation/execution of the laws as regards the tax exemption/refund mechanism (especially in case of VAT) and,

ultimately, slows down the process of the cooperative program implementation. (The experience shows that the VAT paid is reimbursed with substantial delays.)

- Long bureaucratic procedures for granting the status of the technical assistance (aid) to such projects due to insufficient "operating capacity" of the Commission.
- Lack in the Federal Law of any direct prescription concerning complete exemption from taxes to be paid to the budgets of Russian regions (i.e., administrative subjects). More active involvement of regional authorities in the implementation of the U.S.-Russian cooperative programs on nuclear nonproliferation could be a possible solution of this problem.
- Preservation of the so-called "Single Social Tax" to be paid by individuals—Russian tax residents—involved in bilateral cooperative programs. Cancellation of this tax in relation to a relatively minor group of Russian citizens would cause no harm to the R.F. budget, but could contribute to improving the efficiency of the cooperative efforts.

At present the Russian State Duma jointly with the Russian Government and related ministries and agencies are looking for ways to improve the Russian legislation on this subject. Several options are being considered, including introduction of amendments to the R.F. Law № 95 of 1999, adoption of a new Federal law preliminarily entitled "On the Order of Use of the foreign assistance for elimination and dismantlement of weapons of mass destruction in the Russian Federation;" and/or introduction of necessary amendments to the R.F. Tax Code.

It seems that, to resolve some of the above problems, the Umbrella Agreement signed by Russia with 10 countries, the EU, and EURATOM in May 2003 on a “Multilateral Nuclear Environment Program in the Russian Federation" (MNEPR) provides a good example. The Agreement has articles regulating the issues of tax exemption (VAT and other taxes regarding the equipment and goods procured in Russia to implement projects/programs within the Agreement framework) and a simplified order of project registration.

3.2.2. Nuclear Liability

The lack of consensus between the U.S. and Russia on formulation of provisions concerning nuclear liability in the bilateral agreements represents a rather serious impediment to further development of cooperation between the two countries in this area. The problem concerns not only new agreements on nuclear nonproliferation, but also prolongation of agreements in force, such as, for example, the "Nuclear Cities Initiative" (expiration date: September 22, 2003) and the "Scientific and technical cooperation in the management of plutonium withdrawn from nuclear defense programs" (expired on July 24, 2003).

The U.S. insists on inclusion in every new Agreement between the U.S. and Russia (and those to be prolonged) of provisions on nuclear liability similar to the relevant article of the 1992 CTR Agreement. According to the CTR Agreement, the U.S. side obtained immunity for its personnel in case of both nuclear and non-nuclear damages. Moreover, in compliance with the CTR Agreement, the responsibility in all cases rests with Russia, including (intended) legal wrong-doing by a foreign citizen.

The Russian side is ready to implement the "liability exemption," but only within the generally recognized standards of international law and, first and foremost, within the framework of the 1963 Vienna Convention on civil liability for nuclear damage (signed by Russia in 1996 and to be ratified by the Russian State Duma).

The exemption from liability for any damage contradicts the Russian civil legislation in force, which provides for reparation of damages by the guilty person(s).

Thus the above U.S. proposal proves unacceptable for Russia because it would commit Russia to exempt the U.S. side from, first, any (not only nuclear) liability, and, second, from the liability for intended damage.

The Russian side has more than once brought the attention of its U.S. partners to the precedents of not providing exemptions from liability in the case of intended actions by U.S. personnel:

- An Agreement on the operational safety improvements, measures on risk reduction, and nuclear safety standards for civil nuclear facilities in the Russian Federation» (1993),
- The “Nuclear Cities Initiative" (1998),
- An “Agreement on the scientific and technical cooperation in the management of plutonium withdrawn from the nuclear defense programs" (1998).

Another example is the Protocol to the MNEPR Agreement on claims, legal proceedings, and exemption from liability for damaged property, signed in May 2003 by 10 countries (not by the U.S.), the EU and EURATOM. Similar principles had been also put into the 1963 Vienna Convention.

A question may arise why Russia accepted the U.S. wording on liability for damage in the CTR Agreement in 1992, whereas it refuses to do so at present. The reason is that since 1992 important amendments have been introduced into Russian legislation. More specifically, in 1995 the Federal Law on international agreements of the Russian Federation came into effect. In compliance with its provisions, any international agreement between Russia and another country or countries containing clauses that contradict the Russian legislation in force, is to be ratified by the State Duma of the R.F. Federal Assembly.

Because the 1992 CTR Agreement between the U.S. and Russia was signed in compliance with the former Russian legislation, it came into effect immediately on signing without ratification by the State Duma. When the CTR Agreement expired in June 1999 a Protocol was signed to prolong it for 7 years, and today the Agreement is used on a temporary basis. Simultaneously, in compliance with the new Russian legislation in force, a procedure to prepare for ratification of both the CTR Agreement and the Protocol was initiated.

At present the results of considerations of the above documents by the Russian State Duma are difficult to predict because the main provisions of the CTR Agreement Article concerning the civil liability contradict not only the Russian legislation, but also the international legal practices in this area.

As for the prolongation of the U.S.-Russian agreements signed after 1995 and conclusion of new agreements, the Russian sides stands firmly on the need to strictly comply with both the Russian legislation in force and the international legal nuclear liability practices.

Since negotiations on this key subject have virtually reached a deadlock, in order to find a mutually acceptable solution a working meeting between U.S. and Russian experts in the international law would be appropriate in the near future.

The identification and overcoming of the issues related to civil liability for nuclear damage and requiring legislative handling have been a long-standing problem. In recent years these issues have been examined very closely by the Russian State Duma as well as by many governmental and non-governmental entities.

More than once representatives of the donor-countries have placed the issues of "liability for potential nuclear damage" in the forefront and have referred to the 1963 Vienna Convention as one of the fundamental documents in this area, whose ratification by Russia is essential to the implementation of cooperative programs, including those in the nuclear nonproliferation area. Russia signed the Vienna Convention in 1996, but has not yet ratified it. It should be emphasized that among nuclear states only the U.K. and Russia signed it, and none has ratified it. In this context, the importance of ratification of the Vienna Convention by Russia to U.S.-Russian cooperation on nuclear nonproliferation needs further consideration.

3.2.3. Global Partnership Against Proliferation of Weapons of Mass Destruction

The statement made at the June 2002 G8 Summit in Kananaskis, Canada, on establishing the G8 Global Partnership to prevent the spread of weapons and materials of mass destruction (WMD) has been an important step toward reducing the threat of the WMD use. The Global Partnership calls for spending $ 20 billion over the next 10 years (up to 2012) to secure and destroy nuclear, chemical, and biological weapons and materials in the former Soviet Union. In its turn, in compliance with the Russian President's statement, Russia has made a firm resolution to assign $ 2 billion for purposes of the Program implementation.

It is expected that the U.S. will cover one half of the above $ 20 billion since the country invests about $ 1 billion every year in nuclear threat reduction activities in Russia and former Soviet Republics. In fact, the continuation of assistance to Russia within the framework of the CTR Agreement will constitute the U.S. contribution to the implementation of the Global Partnership Initiative. Thus, the 1992 CTR Agreement, along with the Protocol on the CTR Agreement Prolongation of June 1999 and some specific intergovernmental and inter-departmental agreements, form the legal basis of U.S.-Russian cooperation within the framework the Global Partnership Initiative.

However, in practice the assistance to Russia for purposes of WMD destruction depends on the solution of a number of issues that must be regulated by the legislature, such as:

- Transparency of WMD destruction technologies;
- Guaranteeing the expenditure of allocated funds and equipment as intended;

- Taxation of the assistance;
- Access control of foreign specialists to WMD destruction facilities;
- Holding tenders for the right of performing WMD destruction-related work;
- Nuclear liability related issues, including the issue of ratifying the Vienna Convention on Civil Liability for Nuclear Damage.

The above-mentioned draft legislative act "On the order of use of the foreign assistance for elimination and dismantlement of WMDs in the Russian Federation" might be a solution to ensure the economic, scientific, and technical assistance to Russia is provided in keeping with the uniform long-term rules.

3.3. Scientific and Technical Cooperation

3.3.1. The present-day nuclear power industry based on defense nuclear reactor technologies and related fuel cycles (uranium enrichment for thermal reactors and plutonium extraction from SNF to close the fuel cycle) creates a potential risk of generating weapons-grade nuclear materials. A non-nuclear country importing conventional nuclear power technologies can under specific conditions make an attempt to divert it for military or terrorist purposes.

In case of further expansion of these technologies and facilities in the world the international control over them will be bulky and not quite reliable, whereas the prospects for nuclear disarmament will become doubtful. When thousands of tons of fissionable uranium and plutonium isotopes are circulating in the world's nuclear industry, there will be almost no way of tracing their use. In such a context, technological support of the nonproliferation regime should be put in the forefront: international scientific and engineering programs focused on the development of proliferation-resistant commercial nuclear technologies are needed.

It should be emphasized that, in principle, the nuclear nonproliferation problem cannot be resolved only by technological methods, because there will always be a possibility for illegal use of advanced technologies of uranium enrichment or plutonium extraction from the SNF stored for a long time in cooling ponds or dry storage facilities. Such risks could be only averted by upgrading the present day international, political, and legal nonproliferation regime, including relevant measures of protection, control, and enforcement. The introduction of nuclear technologies not requiring uranium enrichment and/or plutonium extraction, as well as other measures related to the implementation of nuclear nonproliferation, should simplify the control problem.

3.3.2. The lack of a U.S.-Russian agreement on peaceful use of nuclear energy and the presence of the so-called “unresolved intergovernmental political issues” hinder the expansion of joint bilateral research and development on advanced nuclear reactors and fuel cycles resistant to nuclear proliferation.

Such work, which is of crucial importance for both countries, was initiated at the U.S.-Russian Presidents' summit in Moscow in May 2002, where a decision was made on the establishment of a working group to prepare proposals on a joint working program on this subject. At that time the

Presidents' initiative was considered a breakthrough in U.S.-Russian scientific and technical cooperation related to the peaceful use of nuclear energy.

In September 2002 the Ministers of the U.S. DOE and the R.F. Minatom approved the working group report comprising recommendations on further activities in this area. However, so far these activities received no further development because of the "Iranian issue" considered above.

3.3.3. A multi-purpose cooperation—with the participation of the U.S.and Russia—on joint development of proliferation resistant advanced nuclear reactors and fuel cycles is needed. Unfortunately, to date these possibilities still remain unrealized. Taking into account the large and, in our strong belief, mutually beneficial potential of the U.S.-Russian cooperation in the nuclear nonproliferation area, this issue is worthy of a more detailed consideration.

As it is known, in spring of 2000 the U.S. initiated a project entitled “Generation IV International Forum” (GIF) aimed at analyzing and choosing advanced technologies for nuclear reactors of the next (the 4th) generation. The project is to perform joint studies, develop and put into operation such reactors after approximately the year 2030. To date, besides the U.S., the following countries are GIF members: Argentina, Brazil, Canada, France, Japan, Republic of South Africa, Republic of Korea, Switzerland, and the U.K. Altogether, 10 countries are participating. In July 2003 EURATOM became the 11th GIF member. As a consequence, today every West European country (EURATOM members) has the possibility to participate or, at a minimum, possess information on GIF implementation. So far appreciable progress has been made, and joint R&D is being initiated as regards six preliminarily chosen technologies. Although remaining outside GIF, Russia has extensive R&D results on most of these technologies.

In the fall of the year 2000 Russia, in its turn, initiated an international project under the IAEA’s aegis aimed at developing innovative nuclear reactor and fuel cycle technologies (INT) to be implemented on a large scale after the year 2050 (INPRO Project). This proposal was based on the R.F. President’s initiative put forward at the Millennium Summit (September 2000) and focused on the development of large-scale international cooperation to develop competitive, ecological, safe and nuclear proliferation resistant INT able to ensure sustainable long-term development of the international society. Blocking of the paths (potential sources of hazard) for possible nuclear proliferation is the key requirement of the R.F. President's initiative. At present 14 countries participate in INPRO, including: Argentina, Bulgaria, Brazil, Canada, China, Germany, India, Spain, the Netherlands, Republic of Korea, Pakistan, the Russian Federation, Switzerland, Turkey, and one international organization (the European Commission). The U.S. does not participate in INPRO.

In June 2003 Phase 1A of the Project was completed. During its implementation the requirements, criteria, and methods for assessing innovative nuclear energy systems were developed, which are to be verified and agreed at the international level. During INPRO’s second phase (scheduled to start in 2005) joint R&D work is planned on technologies chosen by the member countries during the previous INPRO phase.

Both GIF and INPRO are aimed at developing next-generation reactors complying with a set of requirements, with proliferation resistance being one of the fundamental demands. Both the U.S.

and Russia play key parts in the relevant projects. Unfortunately, so far almost no practical interaction between the projects has been established except for exchanges of information and by observers at working meetings. It is also interesting that 5 countries (Argentina, Brazil, Canada, Republic of Korea, and Switzerland) participate in both Projects (GIF and INPRO). The above-mentioned report of the U.S.-Russian working group on advanced nuclear technologies includes a recommendation for Russia to enter GIF and for the U.S. to enter INPRO; however for some reasons (including, evidently, the remained "unresolved intergovernmental political issues") these options are still open.

Both sides realize the unnatural character of the present situation as well as the need for a better distribution and coordination of efforts between INPRO and GIF. In April 2003 the INPRO Secretariat forwarded a proposal to the U.S. DOE to formalize INPRO-GIF relations by developing and signing a Memorandum of Understanding.

In response, the U.S. DOE sent a letter to the INPRO Secretariat, whose fundamental statements could be summarized as follows. First, the U.S. DOE agrees with the need for improving the coordination of goals and contents of both projects to avoid unjustified duplication of research. Second, the U.S. DOE strongly objects to the INPRO Phase II (for the sake of which Russia initiated INPRO in 2000, as an extra-budgetary IAEA project, and still continues its extra-budgetary funding). Instead, the U.S. proposes that INPRO should concentrate its efforts on the development of international requirements for the INTs, with consideration of the whole complex of national, regional, institutional, and other features and matching the INT national regulations. Third countries interested in joint international R&D on innovative (advanced) technologies, but who are not GIF members, are invited to cooperate with GIF under the observance of special conditions. Finally, an attempt can be seen to conduct business in the form of only GIF-IAEA interactions without considering INPRO as an independent partner for cooperation.

In our view, the U.S. DOE attitude, despite its certain rigidity, provides a way for developing and strengthening a constructive dialogue between the two Projects. GIF's strong points are a wide use of powerful financial and technological resources of the member countries and the focus on extensive R&D programs to obtain specific results as regards "Generation III+" technologies in the near future (by 2010) and "Generation IV" in the more distant future (by 2030). In its turn, INPRO's strengths include understanding of specific features of national and regional economic development and a possibility for development, on this basis, of effective requirements for innovative nuclear technologies in the member countries. It can also exert influence on the development of nuclear industries in these countries via the IAEA, as an acknowledged international organization—a specialized UN Agency—possessing well-regulated interaction channels with governments of the member countries and other international institutions.

Based on the above as well as on the results of the just completed Phase 1A of INPRO and the IAEA international conference on innovative technologies held in June 2003 in Vienna, the following seems to be appropriate:

- The INPRO and GIF goals, scope and plans need to be thoroughly coordinated and complement each other. The form of such an arrangement needs to be agreed.

- The INPRO challenges need to be corrected with consideration for the following global priorities:
  - ❖ Research and justification of long-term prospects for nuclear industry and the need for innovative technologies to maintain and enlarge the share of nuclear energy in the international energy markets of the future,
  - ❖ Development of internationally-agreed principles and requirements for INTs with consideration for regional and other special considerations,
  - ❖ Development of an internationally agreed methodology to analyze INTs for their compliance with the established requirements (including analytical/mathematical tools to perform complex estimates of their efficiency, environmental compatibility, safety and resistance to nuclear proliferation) and manuals on practical application of the developed methods,
  - ❖ Development of international recommendations on INT licensing.
- Given the fact that GIF is principally aimed at performing joint R&D on the chosen advanced technologies using resources of GIF member countries, a possibility should be provided for all interested countries (first of all, the INT developers like Russia) to either enter the GIF Project or participate in it under other mutually acceptable terms.

Despite the fact that in the above case the matter concerns multilateral international cooperation, the implementation of the above recommendations depends, mainly, on the U.S.-Russian positions and is directly related to the bilateral cooperation between the two countries in the nuclear nonproliferation area.

It is quite possible that excessive ambitions of both GIF and INPRO have so far hindered their integration or constructive collaboration despite objective reasons requiring such actions. Today the world nuclear industry is going through an important period of tough competition in the international energy markets. The time needed to develop and implement competitive advanced nuclear technologies devoid of the shortcomings inherent in the present-day generation of nuclear energy technologies and capable of ensuring the sustainable long-term development of the society is comparable to the period of depletion of organic fuels. Russia has an important scientific and technical potential and has managed to preserve experienced teams of scientists and engineers. In its turn, the U.S. has the necessary funds and high technology, including materials and electronics. If the countries do not use such a chance, human society may face the risk of a global fuel and energy crisis fraught with social and even military and political implications.

3.3.4. Under present-day conditions, among the scientific problems of nuclear nonproliferation and improvement of the nuclear industry fuel cycle proliferation resistance, assessments of the nuclear proliferation risk remain one of most important but insufficiently studied challenges. Nuclear terrorism should be included. Sub-national terrorist groups, especially those connected to a nation, may act beyond the nuclear power programs, but they may want to use these programs for their own purposes, including fabrication of nuclear weapons (explosive devices) and nuclear terrorist attacks.

The importance and need for developing such a tool to perform quantitative assessments of nuclear fuel cycle resistance to nuclear proliferation was stressed recently by experts of Russia,

the U.S., France, and IAEA at the international workshop entitled: "Methods of quantitative assessments of proliferation resistance of nuclear fuel cycles" (IPPE, Obninsk, June 3-5, 2003).

This workshop was organized and held with support by the U.S. National Nuclear Security Administration (NNSA), the R.F. Minatom, and the IAEA. Principal conclusions of the workshop can be summarized as follows:

- Further important efforts are needed to develop appropriate methods of assessing the proliferation resistance of nuclear energy systems and to elaborate guiding principles for these methods to be used by politicians, designers, and others. The workshop participants considered some promising approaches, including methods based on both the risk concept and multi-attribute utility function (MAU) analysis. The concepts of defense-in-depth and proliferation-resistance culture similar to those used in the nuclear safety area, which potentially could be used when developing and implementing nuclear proliferation resistant systems, were also discussed.

- Case studies should be arranged to apply different proliferation resistance assessment methodologies to specific nuclear energy systems.

- Specialists of different countries need to work together in order to elaborate nuclear proliferation resistance assessment criteria (matrices). Working meetings for experts should be performed regularly to ensure appropriate information exchange on the progress of the work and the results of the case studies. The IAEA is uniquely positioned to facilitate the process and inspire further steps in reaching international consensus on the nuclear proliferation resistance assessments.

Unfortunately, the recommendations of Russian participants to organize a joint study aimed at developing an internationally accepted proliferation resistance risk assessment methodology (including the case studies) are not in the workshop conclusions. It seems appropriate that the U.S. and Russian National Academies should take the initiative and put forward a proposal on such a joint project.

3.3.5. Given the interests of both sides in the achievement of political, scientific and technical challenges, the feasibility and the need of the latter constitute an important factor contributing to the U.S.-Russian bilateral cooperation.

The joint project on conversion of Russian plutonium-producing reactors (1997) is a good example of the above. From the very beginning, some U.S. and Russian project leaders and specialists were rather skeptical as regards the possibilities of reaching the ultimate goals of such a conversion. Finally, in 2000, both the U.S. and Russian Governments began a revision of these goals.

At first it was planned to reduce sharply weapons-grade plutonium production in Russia via converting the cores of three still operating reactors—plutonium producers—and redesigning

these reactors for civil purposes (electricity and district heating). After some years of joint R&D a decision was made to shut down the reactors without their conversion upon completing the renovation of the operating fossil fuelled plants in the area and putting into operation new ones to replace the heat and power produced by the plutonium reactors. In summer 2003 the U.S. made a decision to provide funding support to Russia for the implementation of the new concept.

3.3.6. In 2000 an Intergovernmental agreement on weapons-grade plutonium disposition was signed. According to the Agreement, each side was to convert 34 tons of surplus weapons-grade plutonium to uranium-plutonium oxide fuel to be used in the nuclear industry. A previously signed Agreement (1988) on scientific and technical cooperation on disposition of surplus defense weapons-grade plutonium provided a firm legal basis for the joint work, since it was a reliable and flexible tool in the long-term intergovernmental cooperation. It was within the framework of this Agreement (which was initially valid for 5 years) that all work on the Project was financed. The Agreement made it possible to develop justifications and establish technical approaches to both the U.S. and Russian programs on surplus weapons-grade plutonium disposition, and also to initiate a new area of scientific and technical cooperation on managing plutonium taken out of defense-oriented nuclear programs. The plutonium disposition standards and regulations and the engineering approaches to inspections and monitoring of weapons-grade plutonium management and disposition have been developed under the Agreement.

Consultations with the U.S. side on extending the 1998 Agreement for the next 5-year period have demonstrated that the U.S. links such an extension to the solution of the nuclear liability issues. As a result, since the CTR Umbrella Agreement (1992) is not ratified, and the 1998 plutonium disposition Agreement expired in July 2003 its extension remains an open issue.

In turn, the Agreement of September 2000 signed by the Governments has not yet been ratified by the R.F. State Duma. Such a situation casts doubts about future funding prospects for the bilateral work. In keeping with the U.S. intention for simultaneous start-up of both the U.S. and Russian programs of surplus weapons-grade plutonium disposition, a decision was made to use a U.S. plant designed for fabrication of MOX-fuel in the Russian plutonium disposal program. In January 2003 working meetings were held on the engineering issues related to modifications of the U.S. plant to specific Russian conditions, and the transfer of the license for a French MOX-fuel fabrication technology to Russia.

However, the Russian side believes that the disposition by Russia of 34 tons of weapons-grade plutonium, provided by the 2000 Agreement, and development of needed infrastructure can be made only on the basis of international financing. In October 2002 preliminary consultations of the G8 experts, inspired by political decisions on the "Global Partnership" program, took place in Ottawa in order to develop an international mechanism for funding the Russian plutonium disposition program. To date the integral amount of funding declared by our partners reached the amount of about $800 million. At the same time, the costs of the Russian plutonium disposition program, including operating costs, are estimated at over $ 2 billion. Despite such discrepancies, consultations with the G8 experts on developing an appropriate international financing mechanism are going on.

3.4. Program organization and management

3.4.1. An optimum balance between managerial flexibility and the rigid structure necessary to implement decisions can hardly be reached at early collaboration phases. Such flexibility can only be attained on the basis of personal contacts between program managers once they gain a better understanding of each other's problems and make attempts to meet halfway between the need of fulfilling the orders of their superiors and the possibility for making a decision within the established rules.

An efficient managerial structure can be quickly established only if good practices of the other U.S.-Russian cooperative programs, not necessarily in the nuclear nonproliferation area, have been learned from and emulated (see, e.g., INSP, Item 2.4.). For these purposes the information on such good practices should be widely disseminated, and one of the best ways to do it is by arranging conferences and workshops.

3.4.2. Diversification of cooperative programs by status and scope seems beneficial because specialists of some laboratories are sometimes rather dissatisfied by the progress and results of the U.S.-Russian cooperation. On the one hand, the laboratories express a desire to avoid excessive administration, but, on the other hand, when issues of access control and/or taxation emerge, they look for administrative support from their ministries. An optimum balance could be found by concluding inter-agency agreements, whose execution should be placed on specific laboratories.

3.5. Interactions at different levels

3.5.1. When developing and implementing new programs at every cooperation phase, interactions between the U.S. and Russian Parties at all levels are of crucial importance.

Judging by the very nature of issues accumulated to date within the bilateral U.S.-Russia cooperation (in particular, within the CTR Agreement), which in many cases are matters of principle and hard to solve, improvement of the interactions between the relevant U.S. and Russian structures should be considered as a burning and important task.

An analysis of the status of U.S.-Russian relations in general as well as of the progress and perspectives of the bilateral programs and factors affecting the cooperation is needed to work out recommendations.

It should be noted that, during the first seven years of the CTR Program implementation, U.S.-Russian interactions at the Governmental level, as well as at the level of executive bodies established to implement specific agreements, were rather consistent and effective. Because of that, the CTR Program was in many respects productive in terms of the scientific, technical, and economic assistance to Russia in implementing its international obligations to eliminate its strategic offensive arms, especially in ensuring their nuclear safety and physical protection.

Unfortunately, in recent years the U.S. has reassessed its participation in the international agreements on arms reduction and disarmament. For instance, approaches to the reduction and

limitation of strategic offensive arms in the U.S. and Russia (START) have been fundamentally revised. In particular, the START-1 and START-2 Treaties, in contrast to the SOP Treaty, provided for arms reductions to be performed under mutual, transparent control. In the new Treaty the so-called problem of "break-out potential" in the process of warheads elimination still remains open. The unilateral withdrawal of the U.S. from the 1972 Anti-Ballistic Missile Treaty and failure of the U.S. Congress to ratify the Comprehensive Nuclear Test Ban Treaty (CTBT), which the U.S. was the first to sign in 1996, cast doubts over the possibility of the CTBT ever coming into force. In 2001 the U.S. gave up further negotiations on the development of a verification Protocol to the Biological and Toxin Weapons Convention, which had been conducted in a multilateral format since 1995.

In our view, in order to improve the whole scope of U.S.-Russian interactions, principal agreements need to be made at the top level, i.e., between the U.S. and Russian Presidents, Government executives, foreign policy leaders, and parliamentarians.

There are many examples when decisions made at the top level contributed significantly to facilitating U.S.-Russian bilateral cooperation in general. The essence of such decisions rapidly reached the public in both countries, contributed to the enhancement of activities, and gave an impetus to the managerial structures directly concerned with the development and implementation of cooperative programs in both countries.

Recent meetings at the level of the heads of Governments, especially those within the bilateral U.S.-Russian Commission on economic and technological cooperation (the former Gore-Chernomyrdin Commission), provided a positive example of such collaboration. Among other topics the Commission regularly reviewed a variety of the U.S.-Russian cooperative issues on nuclear energy and identified new lines of interactions between the countries requiring consistent and thorough consideration and a complex approach to implement the accords. During the top-level meetings the Commission's decisions were further developed and supported during bilateral meetings at the highest political level.

Initially a special nuclear energy subcommittee had been established within the Commission framework and later on, in compliance with the decisions of the Commission's 10th Session, major preparatory work was performed on setting up a standing Committee on nuclear energy. The R.F. Government approved this decision, and the Committee's organizational structure and staff were proposed and agreed upon with the R.F. ministries and agencies. The first meeting of the Russian Section of the Committee was scheduled on the first half of the year 2001.

In our view, the establishment of the standing Committee on nuclear energy within the Commission's framework would be a positive example for U.S.-Russian cooperation, and its activities could contribute to further development and strengthening of the U.S.-Russian bilateral relations. However, the new U.S. Administration considered the continuation of joint work within both the Commission on economic and technological cooperation and the Committee on nuclear energy not to be worthwhile.

There is no doubt that that good will of the highest level political leaders toward the related activities of lower-level bodies managing the bilateral cooperation at the inter-governmental, inter-agency and contractors levels will be resumed and receive a new impetus.

3.5.2. It should be also mentioned that, to create a favorable collaborative climate, improve the spirit, mutual understanding and confidence in the bilateral cooperation, and contribute to realization of current efforts focused on the implementation of specific cooperative programs, the contacts and activities arranged by different public and scientific organizations of both countries are important. These include conferences, workshops, training and exchange programs between scientists, students and military personnel, and training programs for specialists of both countries in the nuclear nonproliferation area.

Both national nuclear societies and their youth sections can play a major role in bringing up and training young managers capable of assuming the responsibility for cooperative threat reduction.

3.5.3. During joint work on nuclear materials protection, control and accounting with the participation of the Russian Nuclear Center in Snezhinsk (VNITF), the following interaction issues have been identified as requiring an adequate solution at the governmental level:

- Excessive requests of the U.S. side for detailed data about facilities storing nuclear materials, specific activities with nuclear materials, and their security provisions;
- Changes in the work strategy of every new U.S. Administration and reshuffling of the program management on the U.S. side;
- Underestimation of Russian-specific features, including differences in the U.S. and Russian regulatory frameworks;
- Unacceptable requests of the U.S. side to submit analytical data on the vulnerability and the effectiveness of physical protection of facilities handling nuclear materials, which are strictly confidential;
- Mutual bureaucratic issues; and
- Unconstructive attitudes of the sides on the issues of access control.

3.5.4. Joint Studies on Transparent Dismantlement of Nuclear Warheads

Despite early concerns, the two sides managed to prove that control measures confirming the irreversible dismantlement of nuclear warheads without disclosing confidential information could be developed. The U.S. side initiated the studies, and demonstrated a flexible approach at the early stages of work, whereas the Russian side firmly limited the release of specific information on the facilities to be dismantled and related technologies. Later on Russia expressed its readiness for a larger openness, but by that time the U.S. lost its interest in the matter.

Thus, inconsistent positions of the Governmental officials in both countries have led to the work results left unused. Had some of these results been used in the SOP Agreement, the level of confidence between the U.S. and Russia in nuclear arms reduction area could have been much higher.

3.6. Legacy of the Cold War Mentality

When analyzing the nature of objective impediments to U.S.-Russian cooperation on nuclear nonproliferation and their causes the special role of attitudes and psychological factors inherent to the interacting sides should be pointed out.

Many program managers and specialists involved in the implementation of the U.S.-Russian cooperation grew up and received their education in the Cold War years. Their knowledge, political views and attitudes were formed in the period of severe ideological and military confrontation between the two openly hostile blocs. One way or the other, the Cold War relics exert an influence on the mentality of the new generation as well, despite principally different actual relations between the U.S. and Russia.

Relics of subconscious mutual attitudes toward the partner as though it were a potential adversary, and feelings of distrust and suspicion often cause unnecessary tension during negotiations that hinder attaining effective arrangements.

Setbacks and delays that occur during implementation of the joint programs often result from and confirm the psychological difficulties and negative stereotypes of the participants.

Taking into consideration the psychological inertia and the vitality of ideological doctrines formed by the educational system, family relations, culture (literature, theater, movies) and the mass media, no easy ways to overcome the legacy of the Cold War mentality seem to exist. Long-term, focused, and wide-ranging activities of the Governments, politicians, research and educational institutions are necessary to reach this goal.

The search for a solution of this task could become a strategic goal of the U.S. and Russia in the foreseeable future. It is only the people of new generations, free of the negative Cold War stereotypes and guided by principally a new mentality, who are capable of finally solidifying the emerging relations of trust, friendship and cooperation between the U.S. and Russia, and making the process irreversible.

However, in our opinion efforts to close the gap in understanding the root causes and overcoming remaining differences in the mentalities of the sides should be initiated by the managers and participants in the bilateral cooperation programs and be supported by the governments primarily interested in their success.

In particular, the following set of specific activities could be proposed to improve the efficiency of the bilateral cooperation on nuclear nonproliferation:

- Exchanges between students of military academies and colleges. Such exchanges could be very useful to educate a new generation of specialists capable of understanding the positions of their partners in negotiations and thus able to make compromises. There is no doubt that Russian officers trained at the U.S. military institutions, and their U.S. colleagues after studies at Russian military academies, would find common approaches to

such an important, but very complicated and controversial matter, as nuclear nonproliferation much easier.

So far, the exchanges have been occasional and one-sided: only Russian officers have been trained at the U.S. military colleges and academies. To live up to the expectations of the U.S.-Russian cooperation on nuclear nonproliferation, it is recommended that such training exchanges be introduced on a symmetrical and regular basis.

- Regular exchanges by groups of officers for a short-term training at institutions dealing with nuclear nonproliferation.
- Exchanges by students and post-graduate students for education on relevant subjects at institutions specializing in political science and international affairs.
- Exchanges by groups of scientists for advanced training at research centers studying issues related to national security.
- Enhanced exchanges by scientists to give lectures on topical problems related to nuclear nonproliferation.
- Organization of bilateral conferences and workshops on nuclear nonproliferation on a regular basis.

Development of new joint programs for training exchanges would contribute to the establishment of closer contacts and mutual understanding between the specialists of the U.S. and Russia involved in the implementation of bilateral projects on nuclear nonproliferation.

3.7. Funding Issues

3.7.1. Funding of the absolute majority of the U.S.-Russian nuclear nonproliferation programs is not sufficiently transparent. As a rule only an aggregate total amount allocated by the U.S. Congress for assistance to Russia and CIS countries is released. Sometimes an overall amount to be spent on the nuclear nonproliferation programs in Russia is known. In most cases the funding allocated for a specific ministry is hard to assess.

It would be very useful if information on the expenditure patterns and funding of specific contracts could be summarized yearly and made available. It could give a fair picture of the assistance.

On the one hand knowledge of the expenditures could contribute to strengthening confidence between the sides and, on the other hand, give an opportunity to analyze the ways the funds have been spent. The transparency of the use of funds may reduce indirect expenses in favor of the base-line activities.

The above is also important because in line with the laws of the R.F., the R.F. Minatom and other agencies have to prove the intended use of resources exempted from taxation.

The U.S. side is believed to be equally interested in the intended use of their technical assistance funds granted to Russia. The transparency of financial flows would help Russian agencies in auditing the use of the funds and equipment received via technical assistance programs.

3.7.2. Until 2003, all activities within the U.S. DOE-R.F. Minatom cooperation on export control and nuclear nonproliferation had been realized as technical assistance to Russia within the framework of the global MPC&A Program and, therefore, were exempted from taxes. At present the U.S. side is preparing an independent technical assistance program on export control. To implement this objective the Russian partners should provide an adequate support.

However, in practice the taxes could be exempted only for relatively long-term (at least a year long) contracts. In the case of short-term contracts (2-3 months), like the ones for conduct of a training workshop, it is probably impractical to get the tax exemption certificate in due time, because the review and approval process for the application documents lasts between 3 and 6 months.

It is obvious that the R.F. legislation and regulatory documents (e.g., the Federal Law № 95 of May 12, 1999, and the Instruction on its implementation) regulating the technical assistance to Russia were mainly oriented on large-scale and multi-year projects (e.g., MPC&A program, building of large nuclear facilities, etc.), rather than on a variety of short-term contracts executed by Russian enterprises within this program. For these reasons, today the Russian State Committee is "flooded" with dozens, if not hundreds of contracts requiring a long time for a review. As a result, many enterprises have no way of getting the tax exemption certificate in time, and therefore, after tax deductions those doing the work could actually be left without payment.

3.7.3. Another problem in the practical implementation of cooperative programs between Russian research institutes and the U.S. national laboratories consists of the U.S. preferences to deal with large research centers to the detriment of their smaller enterprises. At the same time one should take into account that, when implementing short-term contracts, promptness in financial matters is of prime importance. However, due to the clumsiness of financial and economic mechanisms at large enterprises, this is not the case, which complicates recruiting and putting on the payroll experts from other enterprises.

3.7.4. Another problem related to paying fees for work done within the so-called "export contracts" is that the U.S. side rarely agrees to include the enterprise overhead costs in the contract cost estimates. However, managers of the Russian enterprises often have to spend a part of the funds on needs not directly related to the contract’s execution. It goes without saying that it can only be done either at cost to the payroll, or from savings.

3.7.5. The above-mentioned complications make grant (ISTC and CRDF) contracts more attractive when compared to the export ones. Still there are also issues hindering the cooperation between the U.S. and Russia.

One such issue is a very time-consuming procedure for getting the consent and approval for funding of ISTC projects. Even if this is a partner ISTC project, when the funding source is known from the beginning, it could take up to a year from the submittal of an application until the conclusion of the contract. Funding limitations of such projects (as a rule, below $300,000) are obviously not sufficient for resource-intensive R&D projects.

3.7.6. However, projects where procurement of dual-purpose goods and technologies liable to export control is involved are the greatest impediment in the ISTC projects.

In compliance with the R.F. legislation in the export control area, the delivery of nuclear or dual-purpose goods and technologies is only allowed if an export license is available. However, the ISTC's status prohibits the transfer of such controlled goods and technologies because the latter, due to their specific properties, can potentially be used to fabricate weapons of mass destruction—in other words, to contribute to nuclear proliferation.

At the same time it is obvious, that the implementation of projects related to the development of advanced nuclear energy facilities having nothing to do with nuclear weapons programs and contributing to nuclear nonproliferation would allow the redirection of many nuclear scientists from military subjects. Most likely, a similar situation exists in other industries dealing with dual-purpose technologies.

Thus, bringing the interests of the international economic, scientific and technical cooperation on the use of nuclear energy in compliance with the requirements of nuclear nonproliferation represents one of the most important and complicated tasks.

Conclusions and Recommendations

1. An ultimate objective of the international nuclear nonproliferation regime is to prevent nuclear weapons from spreading in the world. Therefore the bilateral U.S.-Russian cooperation programs on nuclear nonproliferation and impediments to it should be considered in terms of this international context, i.e., how they affect and reduce the proliferation risk. Bilateral programs with such an objective most meet the interests of both sides, and, therefore, are least subject to the changeable political goals of different administrations, which is a necessary (but not sufficient) prerequisite to make them a success.

2. The U.S.-Russian cooperation programs on nuclear disarmament and nonproliferation are of key importance for strengthening strategic stability in the world and meeting the vital interests of both countries, and for that reason the linkage of their implementation to political or other conditions having no direct bearing on the objectives and contents of the cooperation is believed to be counterproductive.

3. The coincidence of interests of both sides in achieving the political, scientific, and technical objectives of U.S.-Russian cooperation in nuclear nonproliferation and the appropriateness and achievability of the scientific and technical objectives are important factors. The practice of thorough joint examination of need and achievability in the early stages of the cooperation programs has proved justified.

4. A cooperation program has a better chance of success, if its major goals, subject scope, organization, and management issues have been discussed and agreed upon in intergovernmental agreements, and, if necessary, ratified by the U.S. Congress and the State Duma of the Russian Federation.

5. Practical implementation of the goals of the international nuclear nonproliferation regime should be based on elimination of incentives for non-nuclear weapon states to possess nuclear weapons by reducing nuclear arsenals of the nuclear weapon countries, improving the UN system of collective security and the IAEA nuclear safeguards, and encouraging peaceful uses of nuclear energy based on advanced proliferation-resistant technologies.

To this end, extended economic, scientific, and engineering cooperation on the peaceful use of nuclear energy by the U.S. and Russia with third countries, provided the requirements of the international nuclear nonproliferation regime are unconditionally met, is believed to be especially beneficial and effective.

6. Under the conditions when countries that acquired nuclear weapons after the conclusion of the Nuclear Nonproliferation Treaty (NPT) may not be a party to the Treaty, or leave the Treaty without an adequate and certain response from the world community, the effectiveness of such a Treaty becomes substantially downgraded. Apparently, a solution to nonproliferation could be only feasible when possession of nuclear weapons becomes a burden substantially outweighing the benefits. In other words, the political and economic costs of entering the nuclear club should be made high enough to render the entrance too expensive and therefore unjustifiable.

7. Bans are often counterproductive, rather than effective; therefore in order to reduce the proliferation incentives some more attractive alternatives to the use of potentially dangerous nuclear materials should be sought and suggested (such as the highly enriched uranium for low enriched uranium [HEU-LEU] program, disposition of weapons-grade plutonium, etc.), provided that the political, scientific and technical objectives of the programs and the international nonproliferation regime are unconditionally met.

In a sense, some basic principles of the “Atoms for Peace” program put forward by President Eisenhower should be revived, especially those related to rendering nuclear power international. In future all nuclear materials and technologies may need to be collected in inter- or trans-national corporations, which would lease nuclear power plants and fuel to the willing countries, reprocess the nuclear spent fuels, and dispose of the wastes.

8. To secure mutually advantageous and fair cooperation (international) nuclear nonproliferation requirements (or standards) should be developed and introduced when conducting joint research of nuclear facilities important for the national security of nuclear weapon states, as well as when they carry out economic, scientific and engineering projects in the area of peaceful use of nuclear energy in third countries. These requirements should completely correspond to the NPT and other relevant international and national legislation of the interested countries.

9. A U.S.-Russian Commission on Nuclear Nonproliferation is recommended to coordinate the entire spectrum of issues on the implementation of bilateral cooperation on nuclear nonproliferation, including, but not limited to, initiation of project proposals, setting priorities, assessment of required resources, information sharing, and confidentiality.

10. For better coordination of all nuclear nonproliferation activities at the national level, special nuclear nonproliferation representatives are proposed for the U.S. and Russia. They would report

to the respective presidents of the countries and head inter-agency councils on nuclear nonproliferation.

11. Accelerated development of large-scale bilateral U.S.-Russia economic, scientific, and engineering cooperation on the peaceful use of nuclear energy would undoubtedly contribute to better mutual trust and confidence. The earliest conclusion of the proposed bilateral agreement on cooperation on the peaceful use of nuclear energy between the U.S. and Russia would establish necessary political and technical framework to translate this potential into practice.

12. Joint development of advanced and innovative nuclear energy technologies resistant to proliferation of nuclear weapons is deemed to be an especially important and promising opportunity for U.S.-Russian cooperation on nuclear nonproliferation and related subjects. Both countries have substantial scientific and engineering potential in this area, but to the detriment of long-term interests of both countries (including nuclear nonproliferation) it may not materialize without governmental support due to tightening competition in the world and national energy markets, as well as constraints on national resources and investments available for the development and demonstration of science-and-engineering intensive technologies. The results of the May 2002 summit of the presidents of the U.S. and Russia in Moscow paved the way to take advantage of the opportunity.

13. The above area of cooperation is believed to be no less significant on a multilateral level. Scientific, engineering, and financial involvement and leadership of the U.S. and Russia in two large independent international projects (GIF and INPRO) on development of advanced and innovative nuclear energy technologies to meet the international requirements of the future, including the resistance to nuclear proliferation, prove the importance that both countries attach to this long-term issue.

On the other hand, having two international projects with similar goals and less than sufficient coordination between them on the strategic and tactical level may be fraught with unjustifiable duplication of work and inadequate use of available resources, and lead eventually to degraded competitiveness of nuclear energy in the world energy markets of the future.

14. In the present-day world proliferation risk assessments, including the risk of nuclear terrorism, are one of the most important, but insufficiently studied areas related to nuclear nonproliferation and the proliferation resistance of nuclear power fuel cycles. Joint development of an internationally acknowledged nuclear proliferation risk assessment methodology and its introduction into international practices related to the use of nuclear energy would substantially reduce the subjectivity when estimating this important criterion. Both the U.S. and Russia have some advanced applied studies in this area. The National Academies of the U.S. and Russia appear to be well positioned to take the initiative and suggest a joint project with high scientific content and practical implications.

15. When implementing programs of U.S. technical assistance to Russia, well-coordinated approaches by the sides to legal matters, including taxation and nuclear liability issues, are of high importance. The fundamental position of Russia consists of the need to strictly follow the national legislation of the countries and established international law and practices in this area.

16. The legal basis and current practices of tax exemption in relation to funds, goods, and services received by Russian participants in the U.S. technical assistance programs on nuclear nonproliferation deserve thorough scrutiny. This is especially important for relatively small short projects (a few months long), because current procedures and practices make the tax exemption (or refund) in many cases hard to do or even impractical.

The grants from the ISTC, CRDF, and other similar organizations and funds to a large extent solve the problem of tax exemption. However, the requirements for export control for the procurement of dual-purpose goods and technologies within such projects, the complexity and duration of the formal project review-and-approval processes, as well as established caps on project costs, substantially lessen the efficiency of attaining project goals.

17. Provided the recovery of the Russian economy continues, given the commensurate nuclear potential of the U.S. and Russia and the high international nuclear nonproliferation profiles of the two countries, the development and implementation of bilateral U.S.-Russian cooperation programs in this very sensitive area should be increasingly converted from programs of U.S. economic, scientific, and engineering assistance to Russia towards cooperative programs based on equal partnership and balanced inputs of intellectual, material and financial resources.

The recent highest-level declaration of Russia's intent to contribute about $2 billion to the success of the "Global Partnership" program within 10 years has started the transition of Russia from the category of a recipient country to a partner, which undoubtedly should have a positive impact on Russia's cooperation with other countries, including the U.S.

18. A combination of large-scale high-visibility projects managed by administrations of the presidents of the U.S. and Russia with relatively medium and small projects (down to the level of national laboratories and research centers) should ensure the attainment of the strategic political goals of the two countries on nuclear nonproliferation, and also encourage the initiative and meet the specific interests of project participants.

19. The quest for easier access of specialists to the sites and simplified immigration rules of the countries in relation to the participants of the U.S.-Russian nuclear nonproliferation programs without sacrificing the national security interests of the sides should continue to be on the lists of things-to-do of respective U.S. and Russian authorities.

20. The employment and social security of acting and retiring Russian nuclear weapon scientists in order to lessen the likely incentives for them to seek employment matching their qualifications in the third countries and, therefore, reduce the risk of getting employed by potential proliferators, should remain one of the goals of the U.S.-Russian cooperation on nuclear nonproliferation, and first of all, for the ISTC projects.

21. Extended exchange and utilization of the lessons learned from the experience gained in the U.S.-Russian cooperation on nuclear nonproliferation and other areas related to the use of nuclear energy will enhance the organization, management, and coordination of the nuclear nonproliferation programs, and improve the interactions at all levels.

Establishment of ministerial joint coordinating committees and joint consultative and coordinating groups comprising lead scientists and specialists of both countries, as well as transparency of project implementation based on wide access to related scientific, technical, organizational, administrative, and financial information are considered to be good practices to emulate.

22. Despite some mistrust between the sides inherited from the past (relics of the Cold War), the long-term strategic interests of the U.S. and Russia in nuclear nonproliferation converge and should prevail over the short-sighted subjective considerations and interests of some managers.

To this end education, training, and promotion of specialists and managers belonging to the new generation of people who are free of the negative heritage and capable of working efficiently in realities of the changed world should be one of the priorities of the bilateral programs. In particular, expanded and more balanced exchanges between the students of military and civil universities and colleges, groups of officers, scientists, and professors are believed to contribute to improving the effectiveness of the interactions and cooperation of the sides in solving nuclear nonproliferation issues. Bi- and multilateral scientific conferences and workshops on nuclear nonproliferation should be conducted on a systematic and regular basis.

The goal of educating, training and promoting a new generation of specialists and managers goes far beyond the scope of the current project and requires long-term, large-scale and concerted efforts of the governments, political, scientific, and cultural institutions of both countries. It could become one of the strategic goals of the U.S. and Russia for the foreseeable future. Only a new generation of people free of negative stereotypes of the Cold War with a fundamentally changed mentality can eventually nurture the relations of confidence, friendship and cooperation between the U.S. and Russia, emerging not without difficulties, and guarantee their irreversibility.

Attachment 1

List of Russian Participants

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Attachment 2

Issue Summary
Joint Working Group on Overcoming Impediments to Cooperation between the U.S. and Russia on Nuclear Nonproliferation
(Moscow, June 2003)

The United States and Russian Federation are working closely together in many ways to address the threat of nuclear proliferation, in order to enhance both their mutual security and the security of the international system. But just as scientists in different countries need to work together more closely to address the technical challenges of the new security environment, new impediments to international scientific collaboration are emerging. Impediments to the implementation of joint nonproliferation and threat reduction programs are particularly problematic and counterproductive. These impediments to cooperation, and the political, bureaucratic, and structural problems that are behind them, are so complex and interwoven that no one solution will solve the problems. Instead, decision-makers need a variety of options upon which they can draw to address specific problems.

This joint U.S.-Russian academies project will identify and analyze existing impediments and problem areas in the whole set of relationships between U.S. and Russia on nuclear nonproliferation, and will explore how best to overcome those impediments in support of shared goals and the commitments made at the June 2002 meeting of the G8 nations. Instead of offering a series of specific recommendations to be adopted in toto, the report will provide policymakers—and those charged with implementing policy—with a set of tools that will facilitate their efforts to reduce the impediments to scientific cooperation.
The following notes summarize the comments made and issues portrayed as needing attention in early project meetings. Government and non-government experts participated in the discussions in both Washington and Moscow.

I High-level Political Issues and Interests
A. Coordination of the U.S.-Russian bilateral projects on nuclear nonproliferation with the international system of collective security (UN) and the international multilateral cooperation on nuclear nonproliferation (IAEA).
B. U.S. and Russian relationships with third countries in support of peaceful uses of nuclear energy: The existence of such relationships has hindered bilateral U.S.-Russian cooperation in the past, but might present opportunities for more positive directions in the future, if differences in approach can be resolved.
C. High-visibility U.S.-Russian technical cooperation on nuclear energy and other topics: Could become a mechanism for building confidence in the relationship.
D. Residual Cold War mentality on both sides: In both countries, many of those who now run these programs spent much of their careers fighting the Cold War and mutual mistrust is still a problem. Setbacks and errors that occur in cooperative efforts often seem to vindicate negative stereotypes.
E. (For the U.S.) Appropriateness of using defense budget funding for nonproliferation and defense conversion programs.

II Communications
A. Inadequate communication between Washington and Moscow on implementation of programs as a source of political problems (e.g., impact in Washington of Russian difficulty in getting permits for heptyl fuel destruction plant; impact in Moscow of U.S. conditions imposed on DOD programs).
B. Use of transparent managerial tools and mechanisms with equal access for all participants to enhance communication and trust (e.g., budget matrices, clear project lists, well-maintained project web sites).
C. Close interaction between U.S. and Russian project managers and with the federal and regional authorities to avoid misunderstanding and facilitate progress.
D. Establishment of new joint training and exchange programs and enhancement of current efforts: Exchanges of military personnel, scientists, and students (including officers in training), and joint programs for training specialists on nuclear nonproliferation would build mutual understanding.

III. Structure of U.S.-Russian Cooperative Programs
A. "High-profile" vs. "low profile" approaches to program design: diversification of the status and scale of the U.S.-Russian bilateral cooperation on nuclear nonproliferation—provision of large highly visible global programs requiring substantial resources and controlled by the countries' political leadership, alongside relatively small technical and scientific projects, for example, on the level of national laboratories.
B. Balance between flexibility and structure: Programs need to be flexible enough to deal with unpredicted events or trends, but must have enough structure to enforce decisions.
C. Differences in political / administrative structure and culture: Approaches that work in one country may not work in the other because some areas of responsibility are not parallel between U.S. and Russian ministries/agencies, because of differences in programmatic implementing authority, and because of differences in approach to planning and implementing programs.
D. General issues of bureaucratic / administrative structure
1. Matching of program design and goals to the capabilities and strengths of the implementing organization. (example: ISTC might have trouble trying to implement cooperative programs when it is set up to award research grants)
2. Flexibility in applying broad rules to nonproliferation programs: Rigid, literal interpretation of broad rules restricts flexibility and reduces effectiveness. (example: export controls on dual-use technology)
3. Interagency rivalries: In both countries, rivalries generate roadblocks and reduce effectiveness.
4. Incentive as a tool to support a program's effectiveness: A program is more likely to succeed if its success is clearly in the interests of the countries involved. Both sides must be interested to achieve the political and technical objectives.
5. Momentum: planners and managers should acknowledge the importance of establishing and maintaining momentum as a project moves forward.
6. Role of clear organizational mechanisms: The technical assistance program on nuclear safety benefited from a coordinating committee and program office, striking a proper balance in implementation between high-level collaboration and specific technical expertise.
E. Specific legal and procedural issues related to implementation: there are many specific problems that require specific solutions. Once those solutions are implemented, significant progress can be made.

1. Issues include: liability, access, taxation, contracting (see pt. 2) and acquisition procedures.
2. Increased flexibility in contracting procedures: Such procedures tend to be clearly defined and rigid on the U.S. side, but not on the Russian, where the preference is for freedom in the selection of contractors (non-mandatory tenders / sole source contracts).

IV. Funding / Money / Economics: Financial issues are central to cooperation, which brings both problems and opportunities. It is important to attain a sufficient level and balance of resources (financial, intellectual) from both sides for project implementation / management to succeed. (includes part of May 29 Sarkisov paper#8)
A. Problems
1. Risk that program goals will be subverted to financial goals: if those responsible for implementing a program are primarily interested in spending funds up before the end of the fiscal year ("pumping the money out"), they are likely to subvert the program's goals if real progress is not achieved.
2. Risk that political needs and goals will overtake program goals.
B. Opportunities
1. Diversification of the funding sources (stakeholders) may improve chances for success and increase project managers' control over the use of resources. Programs funded from multiple sources come with their own built-in constituency of people and organizations for whom successful cooperation is in their own best interest.
2. If a program is funded by private, non-profit groups, it can have a distinct advantage, particularly when it only involves work in the FSU and can be successful independent of U.S. government action or inaction.
3. As Russia's economy slowly grows stronger, opportunities for cost-sharing between the U.S. and R.F. will increase.
4. The incentive to proliferate may be reduced via creative methods of reducing or eliminating the profitability of proliferation. The "HEU Deal" might be seen as an example of this approach.
5. The pro-business, anti-government stance of the U.S. administration predisposes it toward commercial approaches to addressing problems. Advocates of cooperation should therefore look for opportunities to accomplish goals through commercial endeavors. But such programs are only successful in situations where the paths toward accomplishing program goals and making a profit are indistinguishable. It is unrealistic to expect this to be true in most of the cooperative threat reduction work that remains to be done.
6. Programs are most effective when the U.S. is willing to spend the money necessary to accomplish goals and is prepared to pay fairly for work that gets done. Program staff should be aware of their Russian colleagues' perspective about money, be able to see through Russian modesty to the roots of a funding request, and be as supportive as possible. Missed cues can lead to setbacks in cooperation that are much more costly than the requested help would have been.

V. Leadership and Management Issues
A. As it regains its economic and political strength, Russia is growing weary of being treated as a welfare recipient. Cooperative efforts will be much more effective if Russia is treated as a partner. Such a change in approach should not only happen at the highest political levels, but at the level of individual relationships and interactions.
B. Forms of cooperation—encouraging a transition from largely contractual relationships within the U.S. Government technical assistance programs to Russia (where the U.S.G. is the

paymaster, and Russian companies and organizations—the contractors) to equal partnership relations [balanced inputs of financial, material and intellectual resources from both sides, including selection of subjects for joint research (sites in both countries), symmetrical information exchange, etc.].

C. Clear goals and objectives should be agreed by both sides at the commencement of new projects and updated jointly as necessary over the life of the project.

D. The need to introduce a dedicated high-level policy post, reporting to the respective Presidents and coordinating the whole range of issues related to the implementation of U.S.-Russian bilateral projects on nuclear nonproliferation.

E. Interaction between the federal authorities in the countries; issues of interagency coordination.

F. Need to address at a broad level the problem of confidentiality. Cooperation is hindered repeatedly by the need to renegotiate confidentiality agreements for each activity.

G. American program managers should find serious, competent Russian counterparts and then treat them with seriousness and respect. The culture of Russian bureaucracy is much more personal than is true in the U.S., so Russian colleagues need personal and close interaction. American program managers will be most successful if they take their interlocutors' individual and institutional perspectives into consideration and put more emphasis on personal communication, trust, and networking than they would normally do in the U.S.

H. Personnel issues. It is important that advocates of cooperation find young, knowledgeable leaders, researchers, and managers in the FSU to assume the mantle of cooperative threat reduction from the aging current leadership; pay, benefits, training all are lacking, providing an incentive to take expertise out of the military and nuclear sectors and into private business.

Attachment 3
List of Abbreviations

AMDT	Anti-Missile Defense Treaty
CTBT	Comprehensive Nuclear-Test-Ban Treaty
CRDF	Civilian Research and Development Foundation
CTR Program	Agreement on the Safe and Secure Transportation, Storage and Destruction of Weapons and the Prevention of Weapons Proliferation (Nunn-Lugar Cooperative Threat Reduction Program or CTR Program)
GIF	Generation IV International Forum
HEU	Highly-Enriched Uranium
IAEA	International Atomic Energy Agency
IBRAE RAS	Nuclear Safety Institute of the Russian Academy of Sciences
INPRO	IAEA's International Project on Innovative Nuclear Reactors and Fuel Cycles
INT	Innovative Nuclear energy Technologies
INSP	International Nuclear Safety Program
IPPE	State Unitary Enterprise "Physics and Power Institute" (Obninsk)
ISTC	International Scientific & Technical Center
LANL	Los-Alamos National Laboratory
LEU	Low-Enriched Uranium
LLNL	Lawrence Livermore National Laboratory
MNEPR	Multilateral Nuclear Environment Program in the Russian Federation
MPC&A	Nuclear Materials Protection Control and Accounting
NPP	Nuclear Power Plant
NPT	Treaty on the Non-proliferation of Nuclear Weapons
NW	Nuclear Weapons
PPRA	U.S.-Russian Plutonium Production Reactor Agreement
R&D	Research & Development
R.F. Minatom	Ministry for Atomic Energy of the Russian Federation
R.F. MOD	Ministry of Defense of the Russian Federation
SNF	Spent Nuclear Fuel
SNL	Sandia National Laboratories
SOAE	Agreement on Cooperation in the Elimination of Strategic Offensive Arms (SOAE Agreement)
SOP	Treaty on the Reduction of Strategic Offensive Potentials
SSBN	Strategic Ballistic Missile Submarines
START	Treaty on the Reduction and Limitation of Strategic Offensive Arms (START Treaty)
UN	United Nations
U.S. DOD	U.S. Department of Defense
U.S. DOE	United States Department of Energy
VAT	Value Added Tax
VNIITF	All-Russian Research Institute for Theoretical Physics (Snezhinsk-town)
WMD	Weapons of Mass Destruction

APPENDIX E

U.S. Contribution to the Report on Overcoming Impediments to Cooperation

By William F. Burns and Rose Gottemoeller[16]

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Introduction

Barriers and impediments to cooperation between the United States and the Russian Federation on controlling nuclear proliferation take many forms. Some are the results of differing political systems or the residue of historic clashes between systems and cultures. Some are rooted in such mundane issues as differences in language or geographic location. Some spring from internal political issues that spill over into relations among states. Legal systems and bureaucratic procedures developed at one time for worthy purposes may work at cross purposes to other equally worthy causes today.

In each case, barriers and impediments to cooperation can pose serious obstacles to understanding and the search for common ground as well as to achieving program goals. Because of their nature, some barriers and impediments cannot be entirely overcome, but may be addressed and mitigated with strategies, tools, and resources (language may be the simplest example). Other barriers and impediments may be susceptible to solution through negotiations between or among states. Some solutions are best found within states themselves in the normal political process through education of the electorate and the elected leaders. This often takes time in a democracy and can delay the desirable outcomes of reducing impediments to cooperation.

Whether a national or international political barrier is susceptible to clarification, education, and resolution in the long run is an open question. In the short run, however, if they cannot be removed, barriers must be ameliorated so that the cooperation can continue.

[16] This paper represents the authors' personal opinions and is not an official statement of the Russian Academy of Sciences / U.S. National Academies Joint Committee on U.S.-Russian Cooperation on Nuclear Nonproliferation, or of the National Academies.

Operational Effectiveness in a Political Environment

An essential step in overcoming an impediment to cooperation is identifying and understanding the source of that impediment. This is especially true because these programs are sometimes politically controversial. Opponents of such programs may exploit systemic or structural vulnerabilities in the programs to attack them, although the mechanism used to impede the program may have little connection to the reason for the attack. The true sources of impediments must therefore be identified before solutions can be effected.

Cooperation between nations on nuclear security involves acts of governance and diplomacy, which are by nature political. The political context is simply a fact that must be recognized in assessing impediments to progress on controlling nuclear proliferation. Indeed, were such efforts not political, they would have a life independent of the nations involved and would be unresponsive to each nation's will. At the same time, however, for any program to be effective, it needs to be somewhat robust against political winds and attacks. Attacks that exploit or promote misunderstanding, in particular, are a perversion of truth and make cooperation on vital matters more difficult; in some extreme instances, such cooperation could be rendered impossible. There are sufficient misunderstandings in the ordinary nature of human intercourse without carrying the added burden of political argument and attack whether internal to the nation or external in the international community at large.

Categories of Barriers and Impediments

Recognizing that the sources of particular impediments to cooperation can be many and complex, it is nonetheless useful to group the sources of such barriers into five categories:

1. Those generated by the sensitive character of security cooperation between sovereign states.
2. Those generated inadvertently by established law, regulation, or policy.
3. Those resulting from the lack of established law or regulation.
4. Those generated by bureaucratic practice.
5. Those generated by Cold War perceptions and attitudes.

1. Impediments Resulting from the Sensitive Character of Security Cooperation between Sovereign States

There are special problems attendant to international cooperation on matters of national security. The United States and the Russian Federation, as sovereign states, hold the mission of preserving their national security as among their highest priorities. Some information is kept secret or classified to preserve national security, and information about nuclear weapons is among the most highly restricted in any system. In the United States, there are special provisions for nuclear weapons data, including the notion that some information is classified from the moment it is created, or "born classified."

National security interests also motivate international cooperation on security matters. Successful cooperation in this arena, however, requires that the parties share information that is sensitive or

classified for national security; yet even the closest allies do not share every category of information. The added security afforded nuclear weapons data only increases the burden on those responsible for international cooperation on security matters. Thus a tension exists between the need for secrecy and the need to share secret information to enable cooperation in the interests of national security.

The difficulties of finding the right balance between sharing and withholding information are evident in cases where U.S. officials seek access to Russian nuclear facilities for purpose of oversight for U.S.-funded contracts. Because of Russia's economic difficulties, the United States carries the bulk of the financial burden for U.S.-Russian cooperative programs. Provisions of the laws allocating U.S. funds for these programs require program managers to monitor how the funds are used and what results are achieved. U.S. officials have sought unfettered access to the closed Russian sites where the programs are being implemented (or are to be implemented), similar to what is expected by U.S. officials visiting U.S. facilities: unlimited inspections without notice, and access to not only the laboratory or facility where most of the work is going on, but to other facilities within the site. Russian officials and site managers, however, are often unwilling to grant open access to the sites, and sometimes impede access to the facilities where U.S.-funded work is taking place. Some in the United States insist that because U.S. funds are used, the United States should be granted access. Some in the Russian Federation argue, however, that site visits are intelligence-gathering activities that have little to do with ensuring proper project management. Neither of these attitudes is helpful, and both ignore important realities of the situation. The lack of clarity regarding what information is really needed and what information is truly too sensitive to share has resulted in conflicts that undermine cooperation and delays that impede progress.

2. Impediments Generated by Established Law, Regulation, or Policy

Some impediments to cooperation result from requirements, burdens, or barriers that already exist in established laws, regulations, or policies. If either the goals of a cooperative program or specific programmatic procedures are in tension with, or are in conflict with, established law or regulation, progress may be delayed, operations may be halted, or funding may be put at risk. Any and all of these reduce the program's effectiveness. Such barriers and impediments can be seen by partners, rightly or not, as evidence of a lack of commitment to cooperative efforts, because apparent priority is given to other, unrelated concerns. Delays, for example, can be construed as resulting from indecision, incompetence, or insincerity by partners in cooperation, and can weaken the trust between the two countries.

In some instances, existing laws or regulations do not bear on a cooperative effort itself, or interfere directly with a program, but they do place restrictions or requirements on activities that support the program. Difficulties in obtaining entry visas are an increasingly common example of this type of impediment.

Nationals of the Russian Federation and the United States must obtain visas to visit one another's countries. Prior to the terrorist attacks of September 2001 in the United States, visa issues were at times difficult, creating a hurdle that Russian and American participants in cooperative programs had to overcome to fulfill their jobs. The challenge of obtaining entry visas, of course, has only

increased since September 2001, as the United States has tightened visa policies under the USA Patriot Act, expanding the use of procedures such as interviews and fingerprinting, and broadening the scope of agency review of visa applications. At the same time, the new procedures appear to have eliminated mechanisms for expediting visas for Russians working with the United States to control nuclear proliferation, including those who have previously visited the U.S. for that purpose. New applications for Russian partners seeking entry to the United States often take months rather than weeks to be approved or rejected. In fact, rejections and delays beyond requested entry dates have prevented Russian partners from participating in meetings that promote, or even directly support, cooperative efforts on mutual and international security. The problem is now being compounded as other governments, including that of the Russian Federation, respond to U.S. visa procedures by increasing the rigor of their own visa approval processes and imposing restrictions upon Americans traveling in their countries. It should be possible to meet the need for enhanced visa screening without imposing undue burdens on beneficial international collaborations, especially those that support national and international security. The current visa system, however, interferes with both the specific and general goals of security collaboration with Russia.

Some existing laws, regulations, and policies apply to the cooperative programs more directly. An example is oversight requirements, which are provisions of laws that generally require accounting audits of program funds and verification that funded contracts are being fulfilled. Oversight requirements are not unusual in U.S. programs, and programs for nuclear nonproliferation are almost always subject to such requirements.

The standard way that audits are performed within one nation's government, however, is not always appropriate or possible in the context of international cooperation. There are special problems attendant to international cooperation on matters of national security, as discussed above. Outside of that discussion, however, it is worth noting difficulties in both Russia and the United States related to oversight requirements. There have been several instances in which Russian partners, unaccustomed to such accounting and auditing requirements have misunderstood them or refused to fulfill them. Overseers in the United States, for their part, at times have been inflexible, demanding evidence and accounting in a manner identical to that used in the United States, making little allowance for the fact that they are dealing with ministries of a sovereign nation rather than a company under hire, or for differences in culture.

It should be noted, however, that both sides have improved with respect to these problems over the course of the decade of interactions since the fall of the Soviet Union. As business and commerce develop in Russia, so too does the accounting culture, and some Russian participants now see the oversight process as valuable for program management. And as overseers of U.S. government contracts gain experience in the Russian Federation and understanding of how programs operate there, they are finding ways to get the confirmations and verifications they need. But opportunities for improving these aspects of cooperation still arise frequently.

3. Impediments Generated by the Lack of Established Law or Regulation

Problems in cooperation can also be caused by the absence of a legal or regulatory framework where one is needed. In some cases, the lack of such a framework deprives participants of a

rational process for accomplishing their objectives or solving problems as they venture into uncharted territory. In others, new laws or regulations may be needed to bridge gaps between or within existing legal structures. In the aftermath of the fall of the Soviet Union, for example, the Russian government has faced the burden of designing a new regulatory and legal system, including frameworks for handling nuclear weapons and materials, and for cooperating with the U.S. on nuclear security matters.

Liability concerns are another important example of this sort of impediment. Because of the common hazards involved in any industrial operation, and the inherent danger in working with nuclear materials, governments and companies insist on protection against liability in the event of an accident. Liability protection is of such concern that it is the subject of an agreed statement under the G8 Global Partnership, coming out of Kananaskis: "All governments will take necessary steps to ensure that adequate liability protections from claims related to the cooperation will be provided for donor countries and their personnel and contractors…"[17] This language does not limit the kinds of claims against which donors must be indemnified. In addition to shielding U.S. corporations and scientists in the case of accidents, the United States has sought indemnification against claims of premeditated acts that cause injury or death. The original Nunn-Lugar agreement of 1992 provided blanket liability protection for contractors, but the Russian government has resisted efforts to include blanket liability protection in subsequent agreements and the U.S. government has opposed entering into further agreements without such protection. Indeed, the Nuclear Cities Initiative Agreement, which established U.S. support for shifting Russia's weapons workforce to non-weapons work, was allowed to lapse in 2003 ostensibly because the two nations could not agree on liability protection in cases of premeditated acts. The Plutonium Disposition Science and Technology Agreement (of 1998), in which the U.S. and Russia each agreed to the irreversible disposition of 34 metric tons of weapons-grade plutonium that had been declared excess to defense needs, also lapsed in 2003 under similar circumstances.

The liability issue epitomizes the types of problems caused when a needed regulatory structure is missing. The United States and the Russian Federation need to find a mutually agreed framework that gives due attention to, on one hand, the Russian government's reluctance to literally pay for the mistakes or premeditated acts of an American contractor, and on the other, the contractors' desire to avoid enormous, expensive legal battles, fought in the courts of another country.

4. Impediments Generated by Bureaucratic Practice

Cooperative programs between governments necessarily require extensive bureaucratic structures to operate. But these very structures, and the processes they generate, can impede cooperative programs in many ways. As is true with legal and regulatory frameworks, existing bureaucratic necessities sometimes unintentionally conflict with specific or general program goals. Also similar to legal and regulatory frameworks, the absence of a bureaucratic framework where one is needed, or weaknesses in its design or implementation, can create their own unique impediments.

[17] Quoted in Brubaker, R.D. and L.S. Spector. "Liability and Western Nonproliferation Assistance to Russia: Time for a Fresh Look?" *The Nonproliferation Review*, v. 10, n. 101, Spring 2003.

Examples of bureaucratic burdens on cooperation abound. Bureaucratic issues, for instance, are interwoven throughout the problems with entry visas cited above. Travel restrictions are another example: Participants in cooperative programs often must obtain permission from several agencies within their own government to allow international travel, completely apart from the need for visas. As a recent report says, "In the case of an expert from a Department of Energy laboratory, a typical trip requires laboratory approval, DOE headquarters approval, State Department approval, a Russian visa, and Russian permission to visit a closed area (which typically requires at least 45 days advance notice)."[18] Similar to the process for travel authorization, concurrence requirements apply to approval for many other program activities, often resulting in long lead-times for processing of paperwork for even minor actions. Lack of cooperation among the agencies of one government can result in roadblocks to international cooperation as participants spend time and energy in negotiating the treacherous bureaucratic terrain between departments.

Other barriers to cooperation stem from the differences in Russian and American bureaucratic management cultures. Russians and Americans tend to approach problem-solving, bureaucratic processes, social interactions, professional relationships, and many other aspects of cooperative programs in different ways, and these differences can be difficult for those on each side to understand. Differing approaches to project planning illustrate this point. Relying here on generalizations, Americans tend to pursue goals by laying out a clearly defined framework and making detailed plans before proceeding. Russians often do not (or cannot) use the same approach. As a result, both Americans and Russians may feel that projects are proceeding improperly, because the approach taken does not conform with their cultural norms that define how projects should be done.

5. Impediments Generated by Cold War Perceptions and Attitudes

The final source of barriers to cooperation to be discussed here is in many ways the most difficult to identify and address. The long enmity between the United States and the Soviet Union, which was extremely costly both in lives and money, has left many scars on the relationship between the United States and the Russian Federation. Animosity, stereotypes, and mistrust built up over years or decades do not disappear instantly, and misunderstandings or procedural delays can easily be misconstrued as proof of negative stereotypes.

Although agreements on international cooperation are made between nations, the success or failure of these programs depends on the actions of individuals. Personal attitudes and relationships, then, can be critically important, and residual Cold War thinking can undermine cooperative efforts.

Cold War attitudes can be overt or subtle. In the United States, political leaders who mistrust cooperation with the Russian Federation on nuclear security can damage relationships or impede progress. Because the United States provides most of the funds for cooperative nonproliferation

[18] Matthew Bunn, Anthony Wier, and John Holdren, *Controlling Nuclear Warheads and Materials: A Report Card and Action Plan* (Washington, D.C.: Nuclear Threat Initiative and the Project on Managing the Atom, Harvard University, March 2003), p. 45.

programs, the appropriations process is where some fights over cooperative programs occur. Individual members of Congress who are opposed to security cooperation with Russia can block funds, delay action through investigations, and attach to an appropriation conditions that undermine or complicate the programs.

Cold War attitudes may manifest themselves more subtly within cooperative programs. The attitudes may take the form of explicit or implicit disrespect or mistrust, as when participants believe that their counterparts are not capable or worthy of being peers and trusted partners in joint projects. An example of such disrespect is evident when American program managers make decisions affecting Russian interests without consulting their Russian counterparts. Similarly, some Russians believe that cooperative programs are merely a front for espionage. This attitude is apparent when, for example, American government staff take a previously-agreed trip to a Russian facility to check on progress, having followed all relevant U.S. and Russian procedures, and are refused entry at the facility because the local directors have security concerns.

"Fixes" for Barriers and Impediments

The U.S. and Russian governments have succeeded in coping with these barriers and impediments to nonproliferation cooperation over the past decade, but it is clear that they have found no single solution, no "silver bullet," to do so. Given the variety of barriers and impediments described in the preceding section, this should come as no surprise. The problems that have arisen vary in their legal status, in their political impact, in their technical aspects, and in their overall importance to the success of the joint projects. With some impediments, it has been possible to bump along, continuing—albeit with difficulty—project implementation. In other cases, impediments have stopped the cooperation cold.

Mechanisms found by program managers and others to resolve problems fall loosely into seven categories. Two of them involve steps that a government might take unilaterally, such as a change to national law or a governmental reorganization. The remaining five relate to bilateral steps, whether formal agreements or more informal "fixes." In the following section, we describe these categories, provide examples of each, and consider how they might be applied in future.

1. Changes in National Law or Policy Procedures

When the United States and Russia embarked on the "cooperative threat reduction" or Nunn-Lugar program in 1992, they had few precedents to guide them. On-site inspections in the arms control process had begun only a few years before, with the implementation of the Intermediate-Range Nuclear Forces (INF) Treaty. Prior to that time, there had been no routine way for Russians to visit U.S. military nuclear facilities, or vice versa. As far as the weapons laboratories were concerned, the nuclear scientists on each side had built up an enormous stock of respect for the work of their counterparts, but they had had few opportunities to interact with them directly, and no opportunities to visit each other's facilities. Thus, the nonproliferation threat reduction programs were stepping out into virgin territory.

In this context, it is fairly amazing that they were able to do so with relatively few changes to national laws, given the extreme sensitivity of many of the sites involved in the cooperation. In the U.S. case, legislative activity has been focused on providing authorization and appropriations for the programs through the normal congressional budget process, which has enabled new legal language to be generated in budget acts according to needs and requirements. In some cases, it should be noted, this legislative activity has attached conditions to the programs that have themselves constituted impediments to implementation. In other cases, the conditions have been helpful in moving the cooperation forward, such as in the case of the condition that noted the need for increased Russian funding to the Schuch'ye chemical-weapons-destruction plant.

Although relatively few changes to national law have been required to implement the programs, in some cases national law has had an enormous impact on that implementation. This has been the case, for example, with the changes in visa regulations that have flowed from the USA PATRIOT Act, mentioned previously. It is important to note, however, that these new regulations have impacted a wide range of international cooperation, not only those involved with Russia or the nonproliferation cooperation. If the law were to be adjusted in this case, a range of parties well beyond the nonproliferation community might be interested in engaging.

Implementing procedures or regulations can also be changed without impacting the law itself. For example, U.S. and Russian consular officials might decide to streamline procedures or introduce special technologies ("smart passes") that would enable an acceleration in the issuance of visas. This streamlining would be within the existing law, but would refine its implementation.

Changes in national law or the introduction of new laws often require a number of steps in the national political process (whether Russian or American) and a significant amount of time to accomplish. For that reason, pursuit of new laws has not been a frequent mechanism used to speed or ease implementation of the nonproliferation programs. More frequent have been steps worked out on a bilateral basis within the structure of existing laws.

2. Government-to-Government Agreements

At the outset of the cooperation in 1992, the United States and Russia completed an agreement, called the Cooperative Threat Reduction (CTR) Umbrella Agreement, that provided the first legal underpinnings for the CTR program in the Department of Defense, and, later, for additional nonproliferation cooperative programs in the Department of Energy. Other government-to-government agreements were negotiated to underpin additional cooperative programs, such as the Plutonium Disposition Science and Technology Agreement in July 1998, and the Nuclear Cities Initiative Agreement in September 1998.

Such agreements are negotiated with the full permission and oversight of the respective interagency authorities in both countries. For example, in the United States, a so-called Circular 175 process must be completed prior to the start of negotiations, taking into account comments and concerns from a number of government agencies. A similar process appears to take place on the Russian side. Usually, they are signed at a ministerial level, although in the case of the

Plutonium Disposition Agreement, it was signed by the U.S. Vice President and the Russian Prime Minister.

Thus, these agreements enjoy high legal and political status in the two governments. As such, they can provide much-needed authority to advance implementation of joint activities. In the Russian case, they seem to be necessary for certain permissions to be forthcoming, such as access to sensitive sites in the defense or nuclear complex.

However, although such agreements are necessary legal instruments, they are not always sufficient. For example, access to Ministry of Defense facilities in Russia has not ensued simply on the basis of the CTR Umbrella Agreement, but has required a significant amount of agency-to-agency negotiation of special access arrangements.

3. Agency-to-Agency Agreements

With the CTR Agreement as the legal umbrella, agencies such as the Department of Energy and the Ministry of Atomic Energy have negotiated and signed at their level implementing agreements to address the particular issues and concerns related to their specific programs. For example, the Material Protection, Control and Accounting (MPC&A) Program has its own implementing agreement, negotiated and signed in 2000, that provides for particular access arrangements and other details related explicitly to the MPC&A Program. For certain legal protections, such as those related to liability, the MPC&A Program relies on the CTR Umbrella Agreement under which its implementing agreement is nested.

The Defense Department and the Energy Department have negotiated a number of implementing agreements under the CTR Umbrella Agreement. In other cases, agencies have negotiated specific agreements to facilitate project implementation. For example, the Department of Energy has negotiated special additional access arrangements for the MPC&A Program and the Nuclear Cities Initiative; and it has negotiated special project management arrangements for the Plutonium Production Reactor Shutdown Agreement.

In dealing with barriers and impediments to cooperation, such agency-to-agency agreements are especially important, because they flow from the particular experience and concerns accumulated in the course of project implementation. Project managers are able to sit down with their counterparts and articulate exactly what steps will be required to facilitate progress. This type of specificity has been important to the Russian side, where concerns have often been expressed about blanket requests for access or information. The Russians have frequently complained that the United States is simply engaged in intelligence gathering pursuant to the joint projects. Thus, when the United States is able to narrow its requests to areas that are clearly relevant to project management or implementation, it eases concerns on the Russian side.

A side benefit of this agency-to-agency activity is that it has brought Russian experts into contact with project management methods that are standard in U.S. practice. This, in turn, has eased mutual understanding of the most efficient way to accomplish milestones and deadlines in project implementation. This understanding is particularly important in large construction projects with major engineering components, such as the reactor shutdown effort.

4. Manager-to-Manager Working Methods

Although implementing agreements have been a key element in agency-to-agency work, project managers have often found it not only possible but also expedient to define working methods on the ground, in the course of particular project work. Thus, for example, the Department of Energy has worked together with the Russian Navy to develop routine procedures for Navy sites. These include a site survey, vulnerability assessment, initial installation of "quick fixes" (such as simple security improvements to doors and windows), and longer term security upgrades (e.g., new fences, alarm systems, guard towers).

Key to the success of manager-to-manager relations across programs has been the maintenance of small project teams. If teams of a few people (4-6) on each side can be designated and sustained over time, then it greatly facilitates development of the confidence needed to develop working methods in real time, when agency regulation or procedure to guide an operation might be nonexistent. In that case, Russian and U.S. managers have to fall back on mutual confidence that they can accomplish the task of enhancing nuclear security, without causing breaches of security in other areas. The problem with such small teams, of course, is that the individuals involved become exhausted from repeated project trips in very difficult circumstances. Manager burn-out is a constant problem in the most effective and fast-moving programs.

5. "Ad Hoc" Arrangements

The first few years of cooperation between the United States and Russia on nonproliferation projects saw a number of "ad hoc" arrangements to enable project work to move forward, often on the basis of last-minute decisions undertaken by facility managers or security directors. It must be stressed that these arrangements were not in contravention of Russian law or regulation, but simply fell into unknown territory. The United States and Russia had never worked together at sensitive sites in the past, with a few exceptions, such as on-site inspections under the INF Treaty. Ad hoc arrangements thus arose out of the necessity of getting work done in unique circumstances, where the two countries had no agreements to fall back on, but were committed to establishing and carrying forward the cooperation. Sometimes, those involved were working under a commitment set at a very high level, such as at a Presidential summit, and therefore they were accorded some political cover. In other circumstances, however, progress came because individuals were willing to proceed, essentially on their personal recognizance.

In latter years, such ad hoc arrangements have occurred mainly in the context of high level activities, such as ministerial visits. In these cases, the hosting minister has often taken personal responsibility for negotiating special access to sensitive sites or other arrangements with counterpart ministries—thus placing a heavy burden on his store of political capital. It is no surprise, therefore, that willingness to pursue ad hoc arrangements has become more and more rare at high levels in Moscow. Likewise, as attention to the cooperative programs has risen in the Russian Duma and in other agencies such as the Federal Security Bureau (FSB), ad hoc arrangements have virtually disappeared at the facility level.

While ad hoc arrangements have been useful to the programs historically, it is not surprising that they should recede as the programs develop a system of agreements and procedures to underpin implementation. In essence, as project work becomes more routine, there naturally are fewer stretches of unknown territory where the two sides have no precedent—whether legal or experiential—to rely on. Ad hoc arrangements, therefore, will naturally become more rare, but they must not be abandoned all together. At times, intervention from an individual willing to take responsibility—whether minister or facility manager—might be necessary to accomplish an urgent project goal. This necessity should be acknowledged on both sides.

6. General Confidence-Building Activities

Taking responsibility for the risks inherent in the cooperation can be eased through a range of general confidence-building activities that improve the bilateral relationship over time. Thus, for example, military-to-military contacts between the United States and the Russian Federation have played an important role over the past decade in developing the policy environment that has enabled threat reduction cooperation to advance in the Ministry of Defense in Moscow and the Department of Defense in Washington. It seems likely that some of the difficulties encountered in implementing the MOD-DOD programs have come about because of the slow-down in military-to-military cooperation that occurred after disagreements over the conflict in the former Yugoslavia. Restoring military-to-military contacts to the level that they enjoyed earlier in the 1990s might thus enable an acceleration in the defense threat reduction programs.

7. Organizational Changes inside Government

Neither the United States nor Russian government is organized for maximum efficiency in implementing the nonproliferation cooperative programs. In the U.S. case, the interagency structure is fairly well defined, but the process is often weak or non-existent, resulting in poorly coordinated project activity and, at times, duplication of effort. Such duplication, of course, leads to sharp criticism and even greater consequences, such as budget cuts, at the hand of Congress. In the Russian case, the interagency structure has been in considerable flux in recent years, with frequent reorganizations hampering understanding of exactly which agencies must participate in the decision-making process. Agencies not directly responsible for implementation have, as a result, had opportunities to hamper progress or, in some cases, outright veto it.

Solutions in the United States and Russian cases are likely to be different. Some U.S. experts have called for the appointment of a single senior official with links directly to the President. This "tsar," who would reside in the Executive Office of the President, would wield authority over the budgets that individual agencies garner for implementation of the programs. Naturally enough, the notion that wide-ranging budget authority of this kind would reside in the White House rather than in the individual agencies has drawn the ire of many inside the government. Some have argued that, instead of a tsar, a more coherent and focused interagency process should be sought, within the normal tradition of the National Security Council. Such a process would enable efficient coordination and communication among the agencies, but would not control their budgets.

Whether an arrangement of either type would be relevant to the Russian case is unknown. Russian implementation of the programs has evidently benefited from time to time from high-level appointments, such as the appointment in 2003 of a Deputy Prime Minister with responsibility for them. The specifics of Moscow interagency arrangements, however, must be left to the Russian side.

Summary of Observations

After some three months of meetings and interviews with practitioners in and out of government, a number of themes recurred. These center in the two areas that we have highlighted in this paper: barriers and impediments to nonproliferation cooperation and what can be done about them. Although many agree on what the problems are, there is a wide variety of approaches to fixing them. Certain solutions were identified as most appropriate to early stages of cooperation, but they have lost importance as the relationship matured. Other solutions, such as national laws or government-to-government agreements, have proven vital to provide the legal underpinnings for cooperation at high levels. Since those underpinnings have been in place, however, it has not been as urgent to pursue additional high-level undertakings to support implementation of the program. New high-level solutions might be sought in future, but the existing ones are currently sufficient for implementation to proceed.

Instead, the bulk of the solutions that have been identified were engineered to overcome barriers and impediments to program implementation. These have been developed primarily at the agency-to-agency or manager-to-manager level. In general terms, practitioners see this result as positive, because it bespeaks a consensus between the two sides that the programs must move forward and that they can be implemented without constant reference to the political level of government.

This development is consistent with the idea, which the Russian Federation has been emphasizing in its official discussions, that Russia can be more of a full partner in the cooperation, rather than simply an aid recipient. Russia's economy has been growing, and it is contributing a significant amount to the G8 Global Initiative—$2 billion over ten years, which is a contribution second in size only to that of the United States. With Russia beginning to fund or partially fund some of the programs itself, it will assume a more equal role with the United States in designing, planning and managing cooperative projects. It is natural that most of these activities will take place at an agency-to-agency or manager-to-manager level, rather than at a political level.

Of course, barriers and impediments to cooperation are numerous, persistent, and continue to hinder implementation of the joint nonproliferation programs. This analysis merely suggests that the focal point for solutions to these problems is likely to be found at the agency and managerial levels. In addition, the overall tenor of the cooperation would improve if the United States and Russia could return to a vigorous agenda of confidence-building activities, beginning with military-to-military contacts.

Most importantly, both nations would do well to draw from a variety of solutions to problems. Insisting on a "one-size-fits-all" approach has done much to slow or halt program

implementation over the years. In implementing the programs over the past decade, no single solution has been found to be clearly superior to all others in addressing a particular problem. As long as solutions, even quite various, remain within the realm of national law in both countries, they should be considered to be potentially beneficial to effective implementation of the programs. A solution set is a useful goal, rather than a single right answer.