PONARS Eurasia
NEW APPROACHES TO RESEARCH AND SECURITY IN EURASIA

U.S.-Russia Nuclear Lab-to-Lab Cooperation

LOOKING BACK ON A QUARTER CENTURY OF CONSTRUCTIVE RELATIONS

PONARS Eurasia Policy Memo No. 425
March 2016

Alla Kassianova[1]
Stanford University

With the latest protracted nosedive in U.S.-Russia relations, when areas of cooperation have continued to shrink, it is beneficial to reflect on historically constructive joint endeavors, such as the cooperation between the two countries' nuclear weapon laboratories ("lab-to-lab cooperation").

Since 1992, cooperative efforts in this field have produced mutual trust and promoted the common goals of global nuclear safety and nonproliferation. Throughout this relationship, those who participated successfully reconciled their commitment to national security with the benefits of working with a former adversary in pursuit of a meaningful cause. In addition to a safer world and scientific advances, the major payoffs of this collaboration were a wealth of professional and personal ties and an accumulation of mutual trust.

The sentiment from laboratories in both the United States and Russia is that this cooperation was not only productive in its time but should continue. The challenge is how to renew the support for such endeavors in Moscow and in Washington.

The "Lab-to-Lab" Relationship

The principal nuclear weapons facilities involved in the collaboration were, from the United States, Los Alamos (LANL, New Mexico), Lawrence Livermore (LLNL, California), and Sandia (SNL, New Mexico/California), and from Russia, VNIIEF (Sarov), VNIITF (Snezhinsk), and VNIIA (Moscow).

[1] Alla Kassianova is Senior Research Associate for the Lab-to-Lab book project at the Center for International Security and Cooperation at Stanford University. Many of the materials used for this memo are based on related research that will culminate in a forthcoming book by Siegfried S. Hecker, *Doomed to Cooperate: How American and Russian Scientists Joined Forces to Avert Some of the Greatest Post-Cold War Dangers*, Los Alamos Historical Society, Bathtub Row Press, 2016.

The lab-to-lab relationship was authorized and supervised by government agencies, but it evolved at the grassroots level and in its initial stage enjoyed a modest degree of autonomy from government bureaucracy. According to a 1996 interagency document, the U.S. government recognized the lab-to-lab connection as a valuable instrument of national security and foreign policy. The United States used it to pursue the strategic goals of reducing dangers posed by the post-Soviet transformation of the Russian nuclear weapons complex at a time when Russia was undergoing a challenging socioeconomic transition. The Russian government supported lab-to-lab programs to help fulfill its disarmament and nonproliferation obligations and to sustain a uniquely qualified nuclear workforce during hard economic times.

Financially, lab-to-lab cooperation depended on U.S. funds. Despite this asymmetry, specialists from both countries regarded the lab-to-lab cooperation as an equitable relationship based on a synergy of scientific strengths and a parity of intellectual assets.

Cooperation involved thousands of specialists in three main areas of activity: fundamental science, nuclear safety and security, and defense conversion. In the "pure" lab-to-lab collaboration scheme, U.S. laboratories directly contracted Russian scientists and projects were paid for out of research or discretionary funds. In subsequent years, the lab-to-lab process channeled resources from a range of intergovernmental programs on disarmament, nonproliferation, and defense conversion, including the Cooperative Threat Reduction (CTR) program and the International Science and Technology Center (ISTC), as well as in more specialized areas related to nuclear warhead safety (WSSX) and the safety and security of fissile materials (MPC&A).

The WSSX Agreement, which entered into force in 1995, expired in 2005 when Russia opted not to extend it. In the years since, other programs have closed: in June 2013, Moscow informed Washington that it would not renew the CTR umbrella agreement, which provided the legal framework for CTR projects in Russia. (A new bilateral protocol placed U.S. CTR projects in Russia under the existing Framework Agreement on a Multilateral Nuclear Environmental Program in the Russian Federation, signed in 2003). At the end of 2014, a ceremony was held outside Sarov to mark the termination of the MPC&A Agreement of 1999. Russia's withdrawal from the ISTC was planned in 2010; the closure of its Moscow office was announced in July 2015 and the ISTC Secretariat moved to Astana, Kazakhstan. In September 2013, the United States and Russia signed an agreement on cooperation in nuclear- and energy-related scientific research that could serve as an umbrella for renewed lab-to-lab contacts, but it remains effectively frozen.

An Unlikely Relationship

With its depth, productivity, linkages, and accomplished projects, U.S.-Russian nuclear lab-to-lab cooperation came to be seen as an established reality. However, from the

vantage point of the late 1980s, when members of nuclear labs met face-to-face for the first time, such advances were unthinkable. Two steps made them possible.

Governments Open the Gate

As much as lab-to-lab cooperation came to be defined as a grassroots, peer-to-peer relationship, the gate was opened at the intergovernmental level. It was a unique historical moment when Mikhail Gorbachev and Ronald Reagan introduced a sense of dynamism and innovation into the previously straitlaced field of bilateral arms control and nuclear disarmament. In a domain so core to national security as nuclear weapons, no grassroots action was imaginable without explicit government authorization.

At the behest of both states, senior specialists from U.S. and Soviet nuclear weapons laboratories came together in Geneva in 1987 to help diplomats resolve a longstanding problem that was holding up ratification of the 1974 Threshold Test Ban Treaty (TTBT). The issue was disagreement over verification procedures. In an innovative move, the two sides decided to solve the problem with experiments that would allow nuclear experts to cross-evaluate the accuracy of nuclear weapon yield measurement methods. This Joint Verification Experiment (JVE) project, signed in 1988 by George Schultz and Eduard Shevardnadze, envisioned conducting two nuclear test explosions, in Nevada and Semipalatinsk, with yield measurements taken onsite by both sides.

U.S. Ambassador C. Paul Robinson, who was on the JVE negotiation team, recalled the "nearly 3-inch thick" agreement:

> Besides spelling out all of the technologies which both sides agreed would be used in these joint experiments, the substantial size was necessitated mostly by very detailed guarantees to assure the safety and personal security of the inspectors and participants while on the other's territory. All "good intentions by both sides" notwithstanding, the JVE experiments began in what was an atmosphere of great distrust of each other's motives.[2]

Professional Affinity Emerges

The shared experience of jointly applying technical expertise to help achieve common goals during the JVE became the impetus for future lab-to-lab contacts. The actual hands-on collaborative work on numerous challenges involved in a nuclear test with parallel measurements in unfamiliar conditions quickly put interactions on a professional footing.

Several accounts reveal how important it was for both sides to compare notes. As reported on the website of VNIITF (the lead Soviet laboratory for the JVE):

[2] This and subsequent quotations are from papers in the forthcoming volume by Siegfried Hecker.

> The JVE showed that the Russian specialists use computational and experimental methods that are often better theoretically elaborated and more accurate [than those of their American counterparts]. The American side apparently drew their own conclusions.

Because the nuclear experts from both sides were scientists, plans to extend collaboration into scientific endeavors naturally emerged. Siegfried Hecker, director of LANL, recalled a conversation he had with Vadim Simonenko, the Soviet lead measurements specialist, at a dinner in 1988 to commemorate the successful completion of the Nevada test. Simonenko mused that the unique physical conditions during the nuclear test explosion should be used to pursue a strictly scientific joint collaboration. Both Hecker and Simonenko promoted scientific collaboration between the Russian and American laboratories over subsequent years.

The Joy of Doing Science Together

The JVE project led its participants to recognize that they shared a common identity as scientists and professionals, and that this could parallel their respective national security missions. Fortunately, the trajectory of bilateral relations allowed them to pursue interests and aspirations based on such recognition.

The desire to do science together was a substantial bonding factor at all stages of the lab-to-lab cooperation. From the start, Russian nuclear weapons scientists were especially eager to cooperate. Due to the top-secret status of their domain, they had been "invisible observers" for decades of developments taking place internationally in their scientific fields. Their U.S. laboratory peers were natural partners who could validate methods, compare results, and pool resources in pursuit of knowledge. In turn, U.S. scientists were driven by an intense curiosity about the state of Russian nuclear science and the complementarity of their respective strengths in fields of common interest.

After the JVE ended, prodding for scientific collaboration continued, initiated in large part by the Soviet side. In 1989-1990, scientists from VNIIEF and VNIITF, independently but with official support, reached out to their U.S. counterparts with a series of specific proposals for collaboration in the field of super high magnetic fields (VNIIEF) and nuclear physics and thermodynamics (VNIITF).

In an unprecedented move, in 1990 VNIITF and VNIIEF allowed individual American lab colleagues inside the security perimeters of their laboratory complexes. The visit to VNIIEF was arranged as an "impromptu" side trip from Moscow by Viktor Mikhailov, then Deputy Atomic Energy Minister for the nuclear weapons complex. On both occasions, lists of potential topics for collaboration and written proposals to cooperate were handed to the U.S. visitors.

The symbolic starting point of the lab-to-lab relationships was February 1992 when LANL and LLNL in the United States, and VNIIEF and VNIITF in Russia, took turns hosting each other's directors and leading scientists. Rady Ilkaev, future VNIIEF leader, who with his colleagues welcomed the U.S. scientists to their institute, recalls:

> It was remarkable that specialists from another country lying across the ocean from us understood our problems and our issues in a flash.

Steven Younger, who for many years served as the LANL point-of-contact for collaborative programs with Russia, captured the feeling on the American side:

> Though we sat in Russian facilities rather than our familiar offices in Los Alamos, our American cohort often felt almost as if we were looking at ourselves in a mirror, staring across the conference table at our Russian counterparts.

Joint experiments and research activities took off in the fall of 1993, when LANL and VNIIEF conducted a series of joint experiments in high magnetic fields. Both sides provided unique resources that opened possibilities that were separately unachievable. Their series of joint experiments in this area continued for fifteen years. VNIITF signed its initial contracts with LLNL in the summer of 1994 in areas of high-temperature plasma characteristic calculations and the study of potential designs for X-ray lasers on neon-like ions. Many more projects followed.

Enacting Shared Responsibility

In addition to their common identity and interests as scientists, U.S. and Russian participants bonded over a shared sense of responsibility for nuclear weapons. As Hecker said:

> We discovered that we not only shared common scientific bonds, but also the enormous sense of responsibility we had for nuclear weapons. The scientists and engineers of weapons laboratories on both sides considered ourselves the stewards of the nuclear weapons. We conceived them, we designed them, we helped build them, we gave custody to the military, and finally we took them back for disassembly. We had cradle-to-grave responsibility for the weapons and could not rest until they were dismantled.

Participants could collaboratively act on this shared sense of responsibility thanks to two essential conditions.

First, sustained interaction between scientists created a cache of mutual trust and understanding that allowed specialists to be comfortable jointly addressing more sensitive issues directly related to their nuclear weapons responsibilities. Such issues predominantly related to the Russian side, which had enormous challenges with

outdated infrastructure, safeguarding materials, disassembling retired warheads, and downsizing production facilities—all with insufficient funding. Because of the connections and trust between labs, scientists were able to frame these problems as global issues of public safety and nonproliferation, not just problems for Russia. The lab-to-lab connections triggered a sense of responsibility that extended beyond nationally-bound interests for both sides, which allowed them to transcend initial concerns or suspicions about the other side's motives.

Second, no efforts of any consequence would have been possible without the approval of Washington and Moscow. Throughout the years of lab-to-lab activities, scientists on both sides proposed, advised, pushed, and persuaded their respective governments to favor policies that advanced lab-to-lab activities. At the same time, collectively and individually, they invariably obeyed the discipline of their national security missions, which was the most deeply ingrained element of their professional identities. Several lab-to-lab participants on both sides voiced the identical view that in any interaction, it was never difficult to observe the secrecy requirements: "We always knew where the boundary was." In this sense, the lab-to-lab experience proved rewarding because it aligned the chance to work with a former adversary for a meaningful cause in sync with a deeply internalized loyalty to one's original mission.

In Need of Vision and Common Sense

The success of U.S.-Russia lab-to-lab cooperation is perhaps best captured by LANL veteran Paul White, who noted "the power that's unlocked by not having fences," in other words, removing the barriers for collaboration. The necessary enabling condition was the fortunate circumstance that both the U.S. and Russian governments, each for their own reasons, had the vision to support lab-to-lab connections. For a time, and to a certain extent, both governments even accepted the shared advice of the experts.

More of this is needed. Not only should we look forward to a time when cooperation between nuclear laboratories can again be supported, lessons from this approach could very well be applied to other areas in the U.S.-Russia relationship.

PONARS EURASIA NEW APPROACHES TO RESEARCH AND SECURITY IN EURASIA

Elliott School of International Affairs
THE GEORGE WASHINGTON UNIVERSITY