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Nonproliferation through International Lab-to-Lab Technology Cooperation

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At the Lawrence Livermore National Laboratory (LLNL) one of the fastest growing programs as a result of the end of the Cold War is the Nonproliferation, Arms Control, and International Security Directorate (NAI). Since the early 1990's NAI types of programs have grown from a small percentage of LLNL's budget to constitute one of its major programs. NAI's work includes developing instruments to detect chemicals and radiation, analyzing complex national defense problems, anticipating threats to the US, and providing personnel to support national and international efforts in crisis management and arms control. These functions support the US government in dealing with weapons-of-mass-destruction challengesó proliferation, terrorism, and nuclear-state instability. To combat the rapidly emerging chem-bio-terrorism threats, NAI is drawing on LLNL's advanced technologies in bioscience, microfabrication, and computations to help the Department of Energy (DOE)provide major support to the US government.

Half of NAI's effort is directed toward preventing proliferation before it starts, which is the mission of the Proliferation Prevention and Arms Control Program (PPAC). Until recently, our emphasis was on arms control. Now, arms control continues to be an important component while international cooperation and fissile material control are our dominant activities for the Department of Energy.

Many of the post-Cold-War changes are highly visible, such as the elimination of nuclear testing by the United States, Russia, China and other major powers; agreements and continuing negotiations to dramatically reduce numbers of nuclear weapons; and increasing international focus on nonproliferation and counterterrorism. Other changes are less highly publicized but are no less significant. One such area is the increasing interactions between DOE Laboratory scientists and their counterparts in the nuclear weapons institutes of the former Soviet Union. Although the large majority of these Lab-to-Lab activities are currently with the FSU, that experience is leading to important and productive interactions with other countries and regions, most significantly, China and the Middle East.

In contrast to the Cold War years, when most technologies developed at LLNL were solely for the US national defense efforts and therefore classified, many of NAI's new technologies and tools are unclassified and designed for use in a multilateral security environment.

PPAC is the proliferation "Prevention" element of NAI's four-element "Prevention-Reversal-Response-Avoid Surprise" program. We direct some twenty different projects. which have realized about a factor of ten growth in the last four years.

CURRENT ACTIVITIES

Our main responsibilities, currently, are to support the government in (1) preventing the spread of nuclear material, (2) preventing the spread of weapons expertise, (3) disposing of excess weapons fissile material, (4) verifying the Comprehensive Test Ban Treaty (CTBT), and (5) verifying weapon reduction and dismantlement agreements, such as START III. These are areas where the DOE has multi-year, Congressionally-mandated funding, and which have clear national-security purposes. All have strong connections with the Russian Federation.

In addition to CTBT and START, where there are ongoing US-RF bilateral efforts, the Material Protection, Control, and Accounting Program (MPC&A), our largest program, is a multi-lab DOE effort conducted in cooperation with institutes in the FSU to secure weapons-usable fissile material in the former Soviet Union. Smaller, but related US government programsó the International Science and Technology Centers (ISTC), and the Initiatives for Proliferation Prevention (IPP)ó are aimed at providing Russian weapon experts with productive work other than in weapon programs. The plutonium immobilization program, about the same size as MPC&A, is aimed mainly at securing US excess fissile material, but is driven by US-Russian agreements. Our programs in these fissile material and treaty areas represent our established obligations to the US government. MPC&A, IPP, and ISTC depend critically on the close interaction of scientists in the Lab-to-Lab format.

This last summer Lawrence Livermore National Laboratory, Los Alamos National Laboratory and Sandia National Laboratories scientists worked closely with counterparts at the China Institute of Atomic Energy in Beijing, China, to install an MPC&A Demonstration Facility to demonstrate the application of up-to-date technology for the protection and accounting of nuclear materials.

NEW INITIATIVES

PPAC is heavily involved in new initiatives, in which our goals are to anticipate national security needs and to position ourselves for the future international setting. We are increasing our attention on the disposition of US and Russian weapons-usable fissile-material and beginning to study long-term, world-wide needs for disposition. We will combine the newest information management techniques with user-friendly computer software to track nuclear material, worldwide. Building on the MPC&A program, we now have a major role in our government's new Second Line of Defense Program, designed to curtail the illicit transport of items of proliferation concern from Russia and other NIS states. We have initiated high-risk, high payoff research in new radiation detection devices, and are starting to plan for an international radiation monitoring center at LLNL. The DOE recently launched the Nuclear Cities Initiative with Russia, which will expand the activities of IPP and ISTC programs. We are aggressively participating and proposing new initiatives in the US government-directed, US-China, Lab-to-Lab process that is exploring joint work in arms control and nonproliferation.

We initiated, and are now on the verge of establishing an exciting program of cooperation with Middle East states. In two separate thrusts, one on seismic monitoring and another on water and energy management, we are leading joint discussions and studies with Middle East states. In the seismic area, we are already

starting to install seismic-monitoring equipment and to expand cooperation in analysis of seismic data in the region. This responds to a DOE goal of developing regional arms-control and nonproliferation programs. We are exploring ways of establishing LLNL as the recognized center in seismic-monitoring matters by establishing a seismic-analysis center and an on-site-training center at LLNL. The water/energy management project and the seismic monitoring are part of a larger DOE effort to involve the DOE laboratories in an environmental security initiative. Our focus would be to address actual and potential regional environmental concerns and their potential consequences with respect to regional stability and security. Initial support for DOE has focused on issues in the Middle East, China and the FSU.

INTERNATIONAL CHALLENGES AND OPPORTUNITIES AND THE FUTURE PROGRAM

We expect traditional arms control demands, such as CTBT and START, to continue at their current levels for several years, but we anticipate expansion in the already large fissile material area, and accelerated growth in international interactions.

The challenges and opportunities that will continue to drive US national security needs are WMD proliferation, terrorist WMD, regional instabilities, uncertainties in control of Russian nuclear material, China's growing nuclear power program, a leveling of major-power nuclear-weapon strength, and world-wide crises in environmental areas, such as water and energy. PPAC will be involved in all of these areas. Our main challenges are to help position the Laboratory to be a leader in technological solutions to the daunting problem of world-wide fissile-material control and to the increasingly international nature of WMD nonproliferation and environmental security. We see our program contributing to a stronger national security role for NAI/LLNL that might be summarized as "Nonproliferation and Arms Control through International Technology Cooperation."

ADDITIONAL BENEFITS

Our projects are vital to national and international security. Through our cooperative programs in Russia, China and the Middle East, we have been able to help demonstrate technical solutions to some of the difficult technical nonproliferation problems in the world. As important as these benefits are, perhaps more important still are the mutual respect, trust, and openness that are resulting from the interactions between the staff members of LLNL and the scientists of the institutes in Russia and other NIS states, and now with the Middle East and China.