

# U.S. Civilian Research & Development Foundation

## Background

The **U.S. Civilian Research & Development Foundation (CRDF)** promotes international science and technical collaborations. A private, nonprofit organization established in 1995 by the U.S. Government, CRDF has provided grants, technical assistance, and training to scientists and engineers in Eurasia for ten years. Recently, CRDF has expanded its geographical focus to include many areas beyond Eurasia, including the Middle East and Baltic regions.

CRDF believes that the spirit of international science and technology cooperation provides critical benefits to the global community. CRDF supports foreign scientists and their U.S. counterparts in exceptional merit-reviewed research projects. These collaborations advance science and technical agendas of both American and foreign science. They also offer foreign scientists and engineers alternatives to emigration; help prevent the dissolution of their scientific and technological infrastructure; and advance the transition of weapons scientists to civilian work. CRDF also helps to move applied research to the marketplace by teaming U.S. companies with Eurasian scientists, and helps to strengthen research and education in universities abroad.

## Core Programs

- **Cooperative Grants** – Provides competitive research grants of up to two-year support to joint teams of U.S. and foreign scientists in all areas of basic and applied research and development.
- **Nonproliferation** - Promotes the transition of former weapons scientists to the civilian sector through programs designed to bring together U.S. and foreign researchers on collaborative projects.
- **Industry Programs** – Encourages pre-commercial research and development (R&D) collaboration between U.S. industry and foreign scientists and engineers.
- **Centers & Institution Building** – Seeks to prevent the dissolution of scientific and technological infrastructure by building new, sustainable institutions that promote transition to the market economy and democratization abroad.
- **Grant Assistance Program** – Helps organizations successfully implement R&D activities with partners in Eurasia through the CRDF's banking infrastructure, equipment delivery services, travel services, and program management expertise.

## General Statistics

- Since 1995, CRDF has awarded nearly **3,000** grants to **13,000 scientists**—including **2,500 former weapons researchers**—and has committed more than **\$102.8 million** in total support.
- In addition to its own funds, CRDF leveraged **\$36 million** in additional support from Eurasian governments and cash and in-kind contributions from U.S. industry.
- Through its Grant Assistance Program, CRDF has facilitated more than **1,000 individual projects**, valued at **over \$162 million**, on behalf of over 100 clients in business and industry, educational institutes and government.

**About the U.S. Civilian Research & Development Foundation** CRDF is a nonprofit organization authorized by the U.S. Congress and established in 1995 by the National Science Foundation. This unique public-private partnership promotes international scientific and technical collaboration through grants, technical resources, and training.

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## Supporting Scientific Achievement in Ukraine

CRDF works closely with the **Ukrainian Ministry of Education and Science** to develop and implement collaborative programs to bolster scientific achievement in Ukraine. CRDF grants, accompanied by Ministry cost-shares, provide support for collaborative research and commercialization opportunities between Ukraine and the United States through scientific meetings and project funding.

Since 1996, CRDF has awarded **569 grants** involving **1,778 Ukrainian researchers**, including **491 former weapons scientists**—and committed more than **\$11.6 million**. Additionally, the **Ukrainian government has committed more than \$1.8 million** to further support these projects.

The Ukrainian government and Academy of Sciences joined CRDF in hosting an **International Select Conference on Ukrainian Science** in the fall of 2005, with sponsorship from Intel Corporation. The October 31-November 1 conference brought together Ukrainian and international experts to discuss the future of science, technology, and higher education in the country; outline national priorities for building Ukraine's research and development infrastructure; and provide recommendations to both the national government and potential funders and investors in the country's progress.

### Introducing Ukrainian Innovation to the U.S. Market

Funding through CRDF's Industry programs enabled a team of researchers from Amcrys-H and Proteus, Ltd. to perfect the growth, quality, and yield of NaI(Tl) crystals—used in gamma camera detectors, the dominant imaging technology in nuclear medicine today. Innovations by the team, which involves seven former nuclear weapons researchers, include new multi-point measurement procedures that enhance crystal characteristics, such as increasing light output and reducing the level of impurities and other defects. The partner firms also became suppliers of gamma cameras to Philips Medical Systems and GE Medical Systems.



### Improving Road Safety



Under a CRDF Next Steps to Market grant, Ukrainian scientists from the Scientific Research Institute ORION, working with Automotive Technologies International, developed radar for use in automotive performance and safety systems. Intelligent vehicles of the future will integrate GPS, Inertial Navigation, and ORION/ATI radar system to ensure that cars stay in the lanes and on the road, as well as to help drivers prevent collisions. Many of the members of the large team of Ukrainian scientists have experience in the development and production of semiconductor microwave components for the Soviet military.

### Advancing Cancer Therapy Research

With a spectrometer funded by CRDF's Regional Experimental Support Centers (RESC) program, researchers at the Laboratory of Ecology and NMR Group of the Kavetsky Institute of Experimental Pathology, Oncology and Radiobiology are studying the structure of new chemical substances with potential applications in conventional cancer therapy. The laboratory offers the research community at large access to the equipment to support regional technological development.



CRDF supports RESC site such as this Regional Experimental Center for Biomedical and Environmental Research to serve as a hubs for regional economic and technological development by providing access to major state-of-the-art scientific equipment and related training to civilian research institutes in Ukraine.

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## CRDF Strengthens Research in Universities



A study commissioned by the MacArthur Foundation in 1997 found that the greatest positive impact on basic science in Russia could be made by reintroducing and intensively supporting university research and training along the model of the highly successful research universities of North America and Europe. The U.S. Civilian Research & Development Foundation (CRDF) transforms and reinvigorates the training of young scientists by strengthening the basic research capabilities of universities through a program begun in 1998.

### Creating World-Class Research Centers in Russia

In partnership with the Russian Ministry of Education and Science (MinES), and through generous grants to CRDF from the John D. and Catherine T. MacArthur Foundation (\$29.25 million) and Carnegie Corporation of New York (\$4 million), CRDF has established 16 Research and Education Centers (RECs) within competitively selected universities across Russia, 13 of which are outside of Moscow and St. Petersburg.

Each REC is organized on a multi-disciplinary research theme in the natural sciences, generally involving two or more university departments. Initial funding of up to \$1.5 million over five years allows each REC to purchase state-of-the-art equipment which serves as a magnet to attract both established and young researchers. Young investigators are a priority; all RECs spend a minimum of 10 percent of their award on direct support for young researchers. The RECs teach students cutting-edge research methods as well as theoretical knowledge; conduct research that is responsive to local industry's needs; and create cooperative partnerships with other research organizations, including institutes of the Russian Academy of Sciences.

**Institutional Change:** The RECs are designed to assist and encourage the institutions that host them ultimately to become world-class research universities. Improved research and education opportunities create strong institutions that offer scientists alternatives to emigration, encouraging them to work for their countries' futures. The network of collaborations and contacts that each REC develops strengthens the host universities' capabilities and serves as a model for other institutions.

**Sustainability:** Through a planned transition, the RECs are becoming locally sustainable institutions. The Russian government and local sources initially covered 50 percent of the RECs' core grants, a share that began to increase in 2005. Well beyond its positive effect on the universities which host the 16 RECs, BRHE has had an extraordinary influence on higher education policies in the Russian Federation. When the program was introduced in 1998, most universities were pedagogical institutions and fundamental research was carried out in Russian Academy of Sciences (RAS) institutes or elsewhere. In less than a decade, Russian policy has moved from this longstanding bifurcated system to embrace the integration of education and research in the university setting. In 2005, MinES held its own competition to create additional "research and education centers" at Russian universities patterned on the BRHE model.

**Replication:** Because of the program's demonstrated success, similar programs have been initiated in Moldova, Azerbaijan, Armenia, Georgia with the support of the Ministries of Science and Education in those countries. The government of Ukraine has included funding in its 2007 budget for a similar program with the aim of seeking a Western cost-share. Moreover, non-proliferation goals are being addressed in a similar program through a pilot Research and Innovation Center in a Russian university previously allied with weapons-oriented institutes.

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## Ensuring the Future of Science

### Support for Young Researchers

To encourage more students to choose careers in science, all provide support and research opportunities for young investigators. A post-doctoral fellowship competition, established through CRDF and the Russian Ministry of Education, supports 100 young researchers through their projects and as they teach courses at their host RECs. Since 2002, selected REC students have also attended an annual English language training camp, which imparts the technical skills required to understand scientific journals and lectures in English, and to give presentations of their own research.



### Advancing New Knowledge

As one of the first stages of REC establishment, host universities receive significant equipment grants for the purchase of new instruments and materials to expand their research capabilities. With such capabilities, RECs are established as regional hubs for research and development. The Marine Biota Research and Education Center, established at Far Eastern State University in Vladivostock, was retained by an investment company to assess the environmental impact of the proposed oil and gas pipeline planned for Sakhalin Island. The research enabled by the new center and enhanced by industry collaboration has led to the creation of a new discipline at the university, Oil and Coal Chemistry.

### University Research in a Market Economy

In 2003, CRDF hosted twelve Russian technology transfer managers at a training program in the U.S. where they studied the processes of licensing technology to industry, managing externally sponsored research, attracting new investments, and starting-up technology businesses. A year later, in order to continue collaborating on these processes, those managers and others formed the Eurasian Association of Technology Transfer Managers, a professional organization similar to the one where they had been trained. That same year, CRDF led a research management seminar that taught administrators how to handle the financial demands of scientific research and funding. In 2005, interns from six RECs traveled from Russia to study the cycle of sponsored research, from initial proposal to final funding, at several U.S. research institutions and universities.



### Pan-REC Conferences

In addition to core grants, CRDF administers targeted competitive and non-competitive opportunities that create a peer-to-peer forum for learning, exchanging ideas, and networking. Annual conferences unite senior researchers and students from all the centers to share experiences, explore new ideas, and learn of current research by REC scientists. The English language camps and the technology transfer initiative both grew from discussions at the 2002 conference.

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