STCU

SCIENCE & TECHNOLOGY
CENTER IN UKRAINE

ANNUAL REPORT 2015

To advance global peace and prosperity through cooperative Chemical, Biological, Radiological, and Nuclear (CBRN) risk mitigation by supporting civilian science and technology partnerships and collaboration that address global security threats and advance non-proliferation

TABLE OF CONTENTS

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STATEMENT OF THE STCU GOVERNING BOARD CHAIRMAN

Eddie Maier
STCU Governing Board Chairman

On behalf of the Governing Board of the Science and Technology Centre in Ukraine, I would like to thank our host country for its continued support over the last 20 years. The anniversary of the STCU was celebrated in April 2016. A true milestone for the CentreT

At that occasion the founding parties and the Secretariat recalled the achievements and successes of the STCU. This issue of the annual report gives many highlights on what has been achieved over the years. In addition, I encourage all to watch the video on the STCU web-site that summarises past accomplishments and gives useful statistics on the type of projects performed.

Of course, all these successes and achievements would not have been possible without the strong dedication of the Secretariat and the leadership of the successive Executive Directors. The Board is most grateful to all the secretariat members for their day-to-day involvement and enthusiasm in their work.

During these 20 years the objectives of the STCU as those of the ISTC have been adapted to the evolving situation in the region. From scientist redirection to larger scale projects, from WMD to broader dual-use related topics, from regular projects to targeted initiatives and more and more partner projects, the generalised concept of co-funding and last but not least the emergence of more regional scale projects. These are all changes which have been introduced or gained importance over

the years. Both ISTC and STCU have made efforts to streamline their management and the ISTC working group revising its statute and working procedures takes account of the STCU documents to reinforce the convergence of both centres. It is worthwhile to underline that under this converging evolution, both centres signed a partnership agreement with the Middle East Scientific Institute for Security based in Amman, Jordan (MESIS). Both Centres have also reinforced strongly their cooperation with the European Union CBRN Risk mitigation Centres of Excellence; both centres implement projects generated by the Centres of Excellence.

The year 2015 has certainly been crucial to reinforce the STCU in its influence in the security sector. The multidisciplinary scientific activities, its intergovernmental and multilateral dimension give the STCU the basis for being a major player in addressing the challenges the world will continue to be faced with in future.

The year 2015 was busy and stressful for the STCU. Like the year before, the region was confronted with difficult challenges. STCU has been able to respond very well to frequently changing priorities. The STCU has provided its contribution in the improvement of the security of the partner countries of region. Partners are asking STCU more and more to be assisted in the implementation of security related projects.

As Chairman, I would like to congratulate STCU for the achievements of the last 20 years. I would also like that the efforts obtained so far will reinforce even more the role of STCU in scientific cooperation with a security dimension. I also expect new partnerships to come like the one with MESIS.

Eddie Maier,

Chairman of the STCU Governing Board

STATEMENT OF THE STCU EXECUTIVE DIRECTOR

Curtis ''BJ'' Bjelajac
STCU Executive Director

In 2015, the STCU marked two decades of service to the STCU Parties in pursuit of their WMD nonproliferation and CBRN security policy objectives. When the STCU holds its 20th Anniversary event on 6 April 2016, it will have received $275 million (USD equivalent) in approved project funding, and managed over 1,700 collaborative research projects involving approximately 21,000 scientists and technicians from its five partner countries. Nearly 12,000 of these recipients were formerly involved in Soviet WMD programs.

These numbers, however, do not provide a complete picture of the impact of STCU in Azerbaijan, Georgia, Moldova, Ukraine, and Uzbekistan. After 20 years of STCU projects and supplemental programs, thousands of scientists from hundreds of institutes and universities have developed professional connections with academic peers and S&T partners in Canada, Europe and the United States. The STCU assisted institutes to be more successful and self-sufficient, and commercial entities to create successful R&D partnerships. STCU-provided experiences encouraged individual scientists and national S&T leaders to think of new ways to reform and improve their nations' scientific and technical capabilities.

For the STCU Secretariat, 2015 marked the end of two years of dramatic change for its organizational structure: The STCU reduced headquarters staff by almost 40% to meet new challenges as STCU transitioned from a focus on providing grants to former WMD scientists to mitigating CBRN threats at the regional and international levels. The transition has been extremely difficult for the remaining STCU staff members, who have seen the departure of almost 20 colleagues, some of whom had worked with STCU for decades. On behalf of the entire staff, I wish our former colleagues the best of luck in their future endeavors.

The Governing Board and I developed the STCU's current organizational structure to address the projects and challenges that lie ahead. One of these new projects includes a €4.1M project financed by the EU to purchase state-of-the-art equipment and materials to enhance CBRN detection capacity for

Ukrainian and Moldovan border guards. Over the course of 2015, STCU administered competitive tenders using international best practices to procure and deliver equipment and material for this project. This was the first time that STCU had implemented a project on such a scale which did not involve the payment of grants. Although administering grants to scientists remains an important part of the STCU mandate, these new types of CBRN risk mitigation projects require a much more compact organizational structure.

In previous annual reports, I called attention to how the STCU's vision and mission statements approved in 2012 shifted the STCU's focus towards affecting positive change in mitigating CBRN threats at not just the regional level, but also the international level. Since inception, the STCU focused its efforts on the former Soviet Union, specifically Azerbaijan, Georgia, Moldova, Ukraine, and Uzbekistan. However, a good example of the STCU's newly expanded international focus is evidenced by a project signed with the European Union in late 2015. On December 11, the STCU signed a new €1.7M contribution agreement with the EU to purchase specialized CBRN equipment for training first responders in Southern and Eastern Europe. The project foresees not only working with organizations located in the STCU's historical region of operation, but also in countries such as Albania, Armenia, Montenegro, and Serbia. The STCU Secretariat is excited by the new challenges and opportunities presented by this new project, and hopes that this project opens other opportunities to work outside our historical focus.

The Secretariat continued to develop a Nuclear Forensics Targeted Research programme with the launch in 2015 of two additional projects funded by the European Union with approximately € 1.4M. Over the course of the next two years, the STCU will implement the new projects to establish a regional nuclear forensics laboratory in Kyiv, as well as mobile nuclear forensics laboratories in Georgia, Azerbaijan, and Moldova.

2015 saw the STCU wrap up three projects focused on environmental remediation and long-term monitoring methods that may be applied to the Fukushima Region. Along with its sister organization, the International Science and Technology Center in Astana, the STCU participated in project close-out meetings which allowed participating Ukrainian, Kazakh, and Armenian scientists to present their results to Japanese, American, and European counterparts. We hope the resulting discussions and analysis will lead to continued cooperation in the future on remediation and monitoring efforts.

As for further cooperation between the STCU and ISTC, we are continually looking for ways to work together and learn from each other in order to become more effective, as well as to leverage each other's assets to achieve efficiencies and cost reductions. An example of this cooperation is the planned back-to-back STCU and ISTC Governing Board meetings scheduled for December 2016 in Tbilisi, Georgia. For the first time, officials from the highest levels of both organizations will assemble in one place to address the most important issues facing both Centers. It is my firm belief that in order for the two Centers to survive and prosper, they will need to work together as closely as possible, and the planned meetings in Tbilisi in 2016 are good examples of this close cooperation.

Finally, I would like to thank the representatives from all STCU Parties for their continued support of the Center, especially during these last two years of changes. After 20 years of successful activities, the STCU Secretariat now looks to 2016 and beyond – anticipating more years of service to the STCU Parties in advancing global peace and prosperity through cooperative CBRN S&T partnerships and collaboration.

2015 HIGHLIGHTS AND ACCOMPLISHMENTS

EU CBRN CoE PROJECT 3 TRAINING COURSE CONDUCTED BY NATIONAL EXPERTS FOR SELECTED UKRAINIAN NATIONAL PARTICIPANTS, 19–30 JANUARY 2015, KYIV, UKRAINE

During January 2015, the STCU and the Insubria Center on International Security of the University of Insubria (Italy) organized and hosted two weeks of training for Ukrainian bio-specialists (National Participants). The training was part of the EU CBRN Centres of Excellence (CoE) "Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management" project, aimed at promoting sustainable knowledge development and the transfer of best practice and excellence in topical issues on bio-safety, bio-security and bio-risk management.

The Palladin Institute of Biochemistry graciously hosted the training, and its researchers Dr. Galyna Gergalova and Dr. Yaroslava Maksymovych trained 12 Ukrainian bio-specialists from universities and state institutions of Lviv, Kharkiv, Cherkasy, Odessa and Kyiv.

The program consisted of four modules developed in accordance with the concepts and training programs of WHO.

The purpose of the course for National Participants was to:

- Understand the key principles of risk assessment and risk mitigation that contribute to effective bio-risk management;
- Practice using a systematic method of assessment;
- Utilize "Train with the brain in mind" interactive training for adult learning; and
- Learn the legal, ethical and environmental aspects of medical and biological research.

This course was the last training scheduled for the EU CBRN CoE "Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management" project, however the STCU will continue to further promote a culture of security among former weapon scientists and CBRN experts using training, workshops, conferences and other educational tools.

THE SECOND AND THIRD REGIONAL "AWARENESS RAISING AND EDUCATION ON BIOSAFETY AND BIOSECURITY IN UKRAINE" SEMINARS WERE HELD IN LVIV AND TERNOPIL MARCH/APRIL 2015

The second and third regional seminars "Awareness raising and education on Biosafety and Biosecurity in Ukraine", offered under STCU project P633, funded by the Ministry of Defense of the United Kingdom, were held 12-13 March in Lviv and 6-7 April, 2015 in Ternopil, Ukraine. The seminars consisted of three education modules: "Biosafety and Biosecurity in Ukraine: Issues and Problems", "Bioethics in Ukraine: Problems and Objectives", and "Interactive Training of Adults: Bio-risk Management". Project participants Dr. G. Gergalova and Dr. Yaroslava Maksymovich presented seminar modules.

Also, Dr. Gergalova and Dr. Maksymovych organized round-table discussions for university lecturers on teaching biosafety, biosecurity, and bioethics in Ukraine utilizing the University of Bradford series educational resources and training materials. The purpose was to discuss the lecturers' personal experiences as well as problems of teaching these courses for life sciences students in Ukraine, and to share the best foreign experience in education on biosafety and biosecurity among Ukrainian specialists.

The seminars involved about 100 participants, including life sciences specialists, lecturers, postgraduates, and students (at master and bachelor levels) from major universities and

research institutions in Western Ukraine, including Galytskyi Lviv National Medical University, I. Franko National University of Lviv, S.Z. Gzhytskiy Lviv National University of Veterinary Medicine and Biotechnologies, Institute of Cell Biology of the NAS of Ukraine, Y. Fedkovych Chernivtsi National University, I. Horbachevsky Ternopil State Medical University, Vinnytsya National Pirogov Memorial Medical University, and the Podolsky State Agricultural and Technical University.

MEETING ON EMERGING AND RE-EMERGING INFECTIOUS DISEASES, 14-15 SEPTEMBER, 2015

During 14 -15 September, 2015, the French National Institute of Health and Medical Research (INSERM), the International Science and Technology Center (ISTC), the Science and Technology Center in Ukraine (STCU), and the Foundation Merieux organized a meeting on Emerging and Re-emerging Infectious Diseases at the Foundation Merieux Les Pensieres conference center in Annecy, France.

More than 60 scientists and specialists from national laboratories, institutions and universities, governmental and international agencies (including WHO) from across Europe and Asia attended the event. At the meeting, participants discussed existing health care topics, including modern approaches to diagnosis and treatment of dangerous infections like Ebola, MERS, AIDS, multi-drug-resistant Tuberculosis (MDR TB), and establishment of new collaborative contacts between Western and Eastern experts involved with joint R&D projects in infectious disease control, biosafety & biosecurity.

A panel of globally known experts included Professor Andre Syrota, former president of INSERM and former president of the French National Alliance for Life Sciences and Health; Professor Jean-Francois Delfraissy, director of the National Research Agency on AIDS and Viral Hepatitis, and Director of the Institute of Microbiology and Infectious Diseases of the French National Alliance for Life Sciences and Health; and Alain Merieux, President of the Foundation Merieux.

Senior Specialist Dr. Vlada Pashynska headed the STCU delegation and included 11 experienced specialists and young scientists from Azerbaijan, Georgia, Moldova and Ukraine. The meeting's scientific committee invited a number of advanced experts to present findings of their institutions' investigations: Professor V. Zadorozhna, Director of

L.V.Gromashevsky Institute of Epidemiology and Infectious Diseases of NAMS of Ukraine; Professor B. Stegniy, Director of the NSC Institute of Experimental and Clinical Veterinary Medicine; Professor N. Vynograd from Ukraine's Danylo Halytskiy Lviv National Medical University; Dr. Luminita Gutu from Moldova's N.Testemitanu State University of Medicine and Pharmacy, and Dr. S. Gurbanov from the State Scientific Control Institute for Veterinary Preparations of Azerbaijan.

The meeting's scientific program addressed Emerging Infectious Diseases: A Continuous and Global Threat; Hepatitis B (HBV) and Hepatitis C (HCV), and Multi-Drug-Resistant Tuberculosis. At the conclusion of each session, meeting participants discussed problems which the majority of the countries had in common (including highly pathogenic zoonotic diseases, chronic infections with HBV and HCV, and MDR-TB) and set out a program of cooperative countermeasures. Meeting participants recognized the societal challenges regarding threats of emerging and re-emerging diseases and the need for collaboration between human and veterinary medicine to mitigate the risks of spreading infections.

The final ISTC-STCU roundtable meeting was devoted to discussion of implementation of collaborative R&D projects in the future.

2015 HIGHLIGHTS AND ACCOMPLISHMENTS

FINAL ISTC/STCU FUKUSHIMA INITIATIVE EXPERT COMMITTEE REVIEW MEETING IN TOKYO, JAPAN, 5-6 NOVEMBER 2015

The final Expert Committee meeting to review the technical conclusions of the Fukushima Initiative projects, jointly administered by the ISTC and STCU over the past two years, was held in Tokyo from 5-6 November 2015.

The ISTC/STCU Fukushima Initiative was formed in 2012, following the Fukushima Daiichi nuclear accident. The European Union, the Ministry of Education, Culture, Sports, Science and Technology of Japan, and the U.S. Department of Energy's National Nuclear Security Administration (via its former GIPP Program) provided the financial support for the Fukushima Initiative. Additionally, the International Atomic Energy Agency (IAEA) provided technical consulting to the projects.

The Initiative's six research projects developed methods and approaches to monitoring and remediation in the Fukushima Region. Project representatives presented the outcomes of their work, with critical review by experts from Japan, the United States, and the IAEA.

The review session of the Fukushima Initiative recognized the following achievements:

1. The Initiative facilitated the exchange of scientific knowledge from Armenia, Kazakhstan, and Ukraine – countries with robust nuclear programs that have studied incidences of severe environmental contamination within the former Soviet Union;

2. The exchange of this knowledge is valuable because it provides greater insight into the complex relationships of such events with the natural environment and related ecosystems;

3. The projects' results can be used to support monitoring and remediation of the affected environment in and around the Fukushima site;

4. Although the results are considered to be at a fundamental stage of development, through continued study they can be refined and considered for application in the future;

5. Bilateral collaborative studies between the Initiative's scientists and their Japanese colleagues, monitoring and remediation technologies can be applied to the Fukushima area; and

6. International collaboration to understand the realities of a severe nuclear accident is important.

Expanded knowledge contributes to the development of more effective operating structures for the prevention of future events, as well as for emergency response.

The Initiative was a successful showcase of the benefits of joint activity of the ISTC and the STCU.

MEETING WITH THE DIRECTOR GENERAL OF THE SHOTA ROSTAVELI NATIONAL SCIENCE FOUNDATION, 30 JUNE 2015

Curtis "B.J." Bjelajac, Executive Director, and Igor Lytvynov, Senior Deputy Executive Director (UA), met the Director General of the Shota Rostaveli National Science Foundation (SRNSF), Marine Chitashvili on June 30, and discussed mutual cooperation between the STCU and SRNSF and possible areas of targeted future cooperation for 2015/16. The officials agreed to extend the Agreement on Joint Commitment to Support Progress in S&T Priorities in Georgia for an additional three years, to 2019. This document is the foundation of the Targeted Initiative (TI) program which the

STCU and Georgia have administered jointly since 2007. Both sides look forward to the 2016 TI program, which will mark the programme's tenth anniversary in Georgia.

The STCU and SRNSF also agreed to review the criteria for eligible participants for the TI program, in the hope of relaxing the requirements for former weapons scientists and moving toward more work with participants with dual-use knowledge. Both sides agreed that their cooperation in previous years had been highly valuable for the development of Georgian science and the development of contacts between Georgian and Western partners.

MEETING WITH THE PRESIDENT OF THE AZERBAIJAN NATIONAL ACADEMY OF SCIENCES

STCU Executive Director Curtis "B.J." Bjelajac, Senior Deputy Executive Director (UA) Igor Lytvynov, and Chief Financial Officer Anthony Nichol met the President of the Azerbaijan National Academy of Sciences (ANAS), Academician Akif Alizadeh in July, 2015. They discussed the mutual cooperation between the STCU and ANAS, which started in 2003 and possible areas of targeted future cooperation for 2015/16.

Discussions included the registration issues facing newly approved projects in Azerbaijan. Mr. Alizdeh assured the STCU that ANAS will provide support needed to remedy these temporary issues. The sides agreed to continue the Targeted Initiative (TI) programme that the two organizations have jointly administered since 2008. Both sides agreed to review the 2017 TI program with the ANAS with an eye toward increasing the size of TI projects to tackle more resource-intensive scientific issues.

STCU DELEGATION MEETS WITH OBLAST ODESSA AUTHORITIES

On 18 November 2015, a delegation headed by STCU Governing Board Chairman Eddie Maier and Executive Director Curtis "B.J." Bjelajac met with Odessa Oblast officials as part of the Bio-safety and Biosecurity Improvement Programme for the Anti-Plague Station of the Ukrainian Anti-Plague Research Institute (UAPRI). The delegation met with Deputy Governor M. Gaydar, Head of the Department of Health of Odessa Oblast T. Kondratyuk, and Acting Head of the State Sanitary and Epidemiological Service of Ukraine V. Protas to discuss alternative sites for the construction of a laboratory in Odessa, as well as ways that oblast authorities could support the project.

2015 PROJECT ACTIVITIES

ENHANCING REGIONAL CBRN DETECTION CAPACITY FOR BORDER GUARDS IN UKRAINE AND MOLDOVA

Participating parties:
Funding amount: € 4,100,000

In 2010, the EU launched a CBRN risk mitigation - Centers of Excellence initiative. Existing international and national strategies in non-proliferation acknowledge the importance of developing a comprehensive approach, but tend to implement isolated activities perpetuated by the divisional structuring of the chemical, biological, radiological or nuclear (CBRN) sectors. The CBRN issue is often fragmented into single topics – each studied in their own right, but without any research for synergies. This is potentially counterproductive because no single organization possesses all the necessary resources, expertise, and statutory power to examine all the possible aspects of the problem. In order to overcome these problems, the CoE initiative attempts to coordinate efforts at regional and international levels.

As reported in 2013, the STCU Parties agreed to expand the Center's remit and enable it to evolve to focus on other sensitive issues in today's security environment as well as operate within our traditional activities. As part of the EU's CoE Initiative and with an expanded mandate, STCU undertook a major new type of project - working with the Border Guards in Ukraine and Moldova to enhance their CBRN detection capabilities.

In Ukraine and Moldova, radioisotopes are used in medicine, industry, agriculture, scientific research, education, and other areas of the national economy. In the former USSR, there was no accounting of radioactive sources. During the period of 2003 to 2006, the Government of Ukraine performed an inventory of radioactive sources; however, it was mostly administrative in nature and did not take into account materials used for military purposes, 'historical' radioactive sources supplied to Ukraine by the USSR, orphan radioactive sources, and sources that belong to bankrupt businesses. Therefore, potentially harmful sources exist that are not under secure control.

Based on open source information, there have been several incidents in the region involving radioactive sources. In 1989 Soviet authorities detected a 137Cs radioactive source (activity 4,22·1010 Bq) in the wall of a house in Kramatorsk. The Gamma radiation dose rate at the surface of the wall in the building was 200 R/hr, leading to four known fatalities. The source was identified, withdrawn and

placed for temporary storage to the Radon special state enterprise in Ukraine. Later, experts determined that the operators of a local plant in the Donetsk region quarries used the source in the production of granite panels.

During the last year in Moldova, open sources report that authorities detected two cases of RN material smuggling in large cities.

Over the last four years, Ukrainian authorities discovered around 100 cases of illicit trafficking in RN materials. Given the current situation, it is clear that border control against illicit trafficking of CBRN materials needs to be reinforced.

Across the region, intermediate-, and low-level radioactive

sources connected with former military activities, sites or enterprises which used radioactive materials and dangerous chemical substances which were liquidated in the 1990s, remain problematic.

As CBRN materials may also be used for criminal purposes, enhancing the detection and identification capacities of the authorities is crucial to regional security. In addition, given the situation on both the Moldovan and Ukrainian borders, there is a clear need to support the authorities' ability to detect and identify CBRN materials using mobile equipment. This is true of the border areas as well as each nation's interior.

Both countries have some detecting capabilities, especially for RN materials. However, most of the equipment used for detection of CBRN materials is immobile.

The project's overall objective was to combat illicit trafficking in chemical, radiological and nuclear materials in Ukraine and Moldova. More specifically, it aimed to enhance the Ukrainian Border Guards' and the Moldovan Police's ability to detect and identify chemical, radiological and nuclear materials at border crossings and inside their countries.

To make these capabilities mobile, STCU purchased and delivered state-of-the-art CBRN detection and identification equipment, training, and personal protection equipment, including five mobile radiation detection laboratories, gamma and neutron detectors, radio spectrometers, personal dosimeters, individual gamma and neutron dosimeters, chemical detectors, and more than 5,000 protective suits and respirators.

2015 PROJECT ACTIVITIES

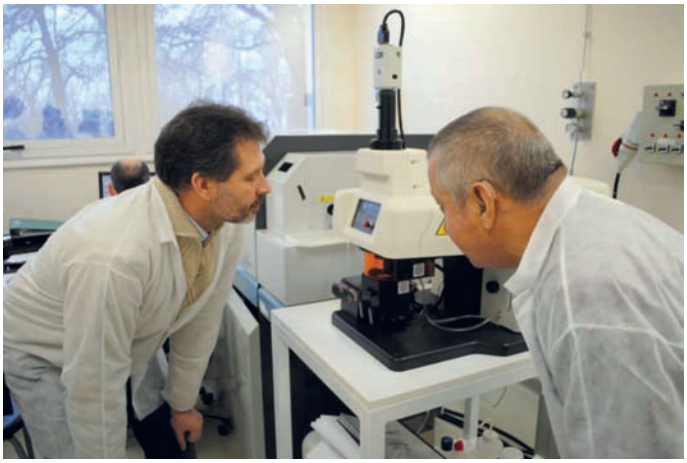
TARGETED RESEARCH PROGRAM: NUCLEAR FORENSICS

The project foresees the creation of a regional nuclear forensic laboratory for GUAM member-states. The laboratory will be created under the auspices of the Institute for Nuclear Research of the National Academy of Sciences of Ukraine (INR) which, in accordance with a decree of the Ukrainian Government, is the primary expert organization for the identification of nuclear and radioactive materials seized in Ukraine. INR has many years of experience in nuclear forensics and possesses basic analytical equipment and the infrastructure to work with nuclear and other radioactive materials.

During the last year, under technical assistance projects, INR received a modern mobile expert laboratory equipped with the tools needed to conduct preliminary expert investigation at an incident site. Also, the INR's expert laboratory has a key analytical device – a mass-spectrometer with inductance-connected plasma Element-2, which allows the conduct of the super-sensitive micro-element analysis of nuclear materials. The equipment is the prerequisite for the creation of GUAM's regional center for nuclear forensics at Ukraine's nuclear research institute.

STCU Project 9901, creating a GUAM regional expert laboratory will accomplish:

- Equipping INR's laboratory with modern scanning microscope with a built-in roentgen-fluorography analyzer for the investigation of chemical elements in nuclear materials and the installation of laser ablation for mass-spectrometer ICP MS Element-2.



- International certification and accreditation of the INR's laboratory in accordance with ISO 9001 standards, providing recognition of analytical investigation results both in and outside the GUAM framework. Inclusion of INR's laboratory into the international network of nuclear forensic analytical laboratories.
- Creation of a communications-information portal with an appropriate database for connection to the regional laboratory with primary expert organizations of GUAM member-states. The portal will include an allocated internet connection, modern computer techniques, and teleconferencing equipment. This will enable the free flow of information, coordination of investigative work, the conduct of expert discussions, and provide the capability for urgent consultations.

DEVELOPMENT OF A COMPLEX SYSTEM FOR AVIAN DISEASE FORECASTING AND CONTROL

Participating parties:
Funding amount: $100,000

A team from the Institute for Experimental and Clinical Veterinary Medicine National Scientific Center in Kharkiv, Ukraine completed STCU project P568A, "Development of a recombinant vaccine against Newcastle disease". The Institute, with US Department of Agriculture support, conducted the project in collaboration with the Southeast Poultry Research lab in Athens, Georgia USA.

The project's significant achievements included developing new diagnostic tools (PCR- and real time PCR-based kits) and prophylaxis (recombinant and DNA vaccines) for especially dangerous poultry diseases like avian influenza and Newcastle disease, using modern technologies for genetic and cell biotechnology, and molecular assays. Project implementers performed wide-range surveillance for these diseases among wild and domestic birds

The project team determined the risks of introduction of the diseases and the possible effects on biological and food safety. Industrial poultry breeding veterinary services successfully implemented the project and developed surveillance programs in Ukraine. The vaccines have been offered on the international veterinary products market.

DEVELOPMENT OF ANISOTROPIC THERMOELECTRIC DEVICES BASED ON SEMIMETAL MICROWIRES

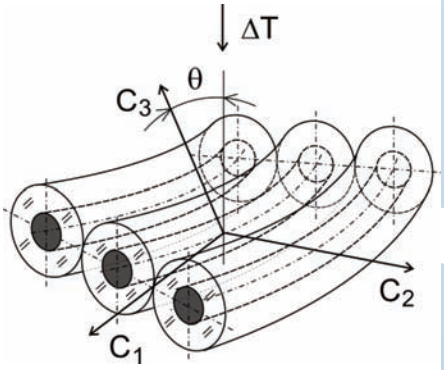
Participating parties:
Funding amount: $49,331

The STCU Project 5986 focuses on the implementation of transverse thermoelectric effects on single-crystal semimetal microwires for localized electricity generating and heat flux sensing. Project implementers intend to develop anisotropic thermoelectric generators (ATG) which will use human heat to produce voltages suitable to supply power to devices with low current consumption (hearing aids, for example).

The ATG module developed through the project can be used as a rapid non-selective infrared detector and gradient heat flux sensor (GHFS) with a characteristic time above 10-3 s. Researchers utilize GHFS in the direct measurement of heat fluxes to a flat plate in pulsed hypersonic gas flow, and also in heat harvesting applications.

The project prepared a thin (2μm < d < 10μm), long (l > 10m) continuous glass-insulated Bi-Sn single-crystal microwire with a high thermopower anisotropy, and recrystallization of glass-insulated Bi and Bi-Sn single-crystal microwires in a high electric field. The recrystallization technology makes it possible to change the orientation of the main crystallographic C_3 microwire axis during the winding of the wire into a spiral flat. The microwire's crystallographic orientation must be the same at all points of the spiral. These features represent the necessary characteristics.

The ATG design is already protected by Moldovan patent (MD 4333. 2015.02.28), and the next steps are for the project team to promote it on the European market (i.e. possibly with Opto Materials S.r.l., Tortoli, Italy).



Anisotropic thermoelectric generator of long single-crystal glass-insulated Bi-Sn microwire wound into a spiral flat (section)

2015 PROJECT ACTIVITIES

NOVEL MULTILAYER CYLINDRICAL CONTAINERS FOR THE STORAGE AND TRANSPORT OF RADIOACTIVE MATERIALS AND ISOTOPES

Participating parties: 

Funding amount: $360,000

The safe storage and transportation of radioactive materials and isotopes represents a big challenge for society. Additionally, there is permanent need for the frequent movement and transportation of nuclear fuel, isotopes, medical isotopes and waste, and other radiation sources from scientific-technological institutes and commercial enterprises. These activities involve exposure risks that must be mitigated by taking protective measures against neutron and gamma radiation and environmental spills.

The main task of project P506, "Development of Novel Multilayer Cylindrical Containers for the Storage of Nuclear Waste and Nuclear Fuel" was to design and fabricate multilayer cylindrical containers and structural materials with intermediate boron carbide, lead or lead + tungsten layers. The utilization of highly enriched (B10) boron carbide and boron powders, and the application of explosive shock-wave compacting technology (ECT) enabled the attainment of high-density layers of boron carbide and boron at up to 92-97% of the theoretical value. The basic multilayer container walls, as well as the container bottom and cover, will employ aluminum-boron carbide-lead-aluminum layers. Depending on the intensity and density of the radiation, highly enriched boron carbide and lead oxides can be applied instead of un-enriched boron and metallic lead.

The novelty of this new approach hinges on the application of specially developed processes and equipment. The result is the formation of multilayer high density walls and covers for containers using the process of explosive consolidation technology (ECT). The proposed technology allows the consolidation of different compounds of refractory and metallic powders with a loading intensity of 10-20 GPa and higher.

The simple and low-cost technology of the fabrication of cylindrical multilayer hollow billets for containers results from the application of low-cost and widely available industrial explosives.

(a) the process of preparing the blend of explosive powder, (b) a ready explosive charge with container assembly and (c) fabricated billets of multilayer containers jacketed by steel.

CRITICAL ISSUES OF PLASMA-SURFACE INTERACTION IN INTERNATIONAL FUSION REACTOR ITER

Participating parties:
Funding amount: €40,064

STCU Project 6057 addresses one of the most urgent areas of power engineering research – the development of thermonuclear energy sources acceptable for mass use according to the International Thermonuclear Experimental Reactor (ITER) creation program.

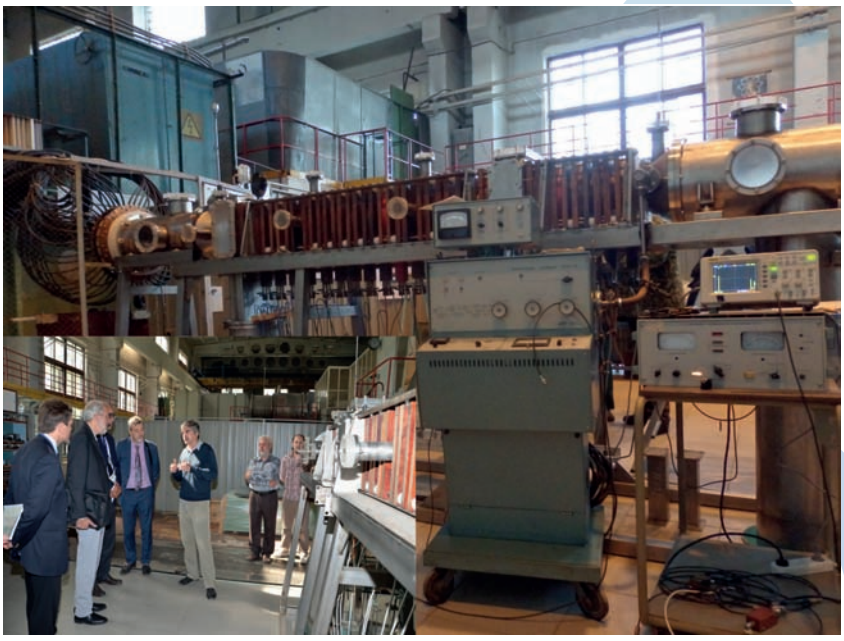
The EU and Ukraine jointly finance the project as part of the STCU-National Academy of Sciences of Ukraine Targeted Initiative program. Scientists from the Kharkiv Institute of Physics and Technology's National Science Center (NSC KIPT) of the National Academy of Science of Ukraine are focused on three critical issues related to the operation of ITER, which is being built with guidance from an international consortium:

1) comprehensive experimental simulation of transient loads to ITER surfaces in extreme conditions;

2) the study of the behavior of tungsten as the most likely material for the reactor's first wall in conditions of stationary irradiation by plasma and charge exchange atoms, and

3) analysis of physical processes and scenarios for the conditioning and functioning of the first wall of the ITER.

The project's primary goal is to evaluate how fusion materials will perform in high heat and particle loads in fusion reactors. As Ukraine is not a party to the ITER project, STCU project activity creates a unique possibility for the participation of Ukrainian scientists in international collaboration involving the ITER project and in the Eurofusion program. STCU projects such as this facilitate the involvement of unique Ukrainian experimental equipment like the stellarator and QSPA plasma accelerator in the experimental study of plasma-surface interaction in the extreme conditions of a fusion reactor.



Visit of an EU delegation to the NSC KIPT on QSPA-M facility during September 2015.

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2015 PROJECT ACTIVITIES

DEVELOPMENT OF A HIGH PRESSURE HYDROGEN ELECTROLYZER FOR STORAGE/USE OF RENEWABLE ENERGY

Participating parties: 

Funding amount: $473,000

The Yuzhnoye State Design Office in Dnipropetrovsk, Ukraine and the Institute of Mechanical Engineering Problems in Kharkiv, Ukraine, in collaboration with the US-based Pacific Northwest National Laboratory (PNNL), created a system to convert and store energy using hydrogen (STCU Partner Project P587). The system allows large power systems to use renewable wind and solar energy, and it is particularly applicable to water desalination technology.

The process developed by Ukrainian scientists makes it possible to convert excess electricity into hydrogen and oxygen, and to accumulate it in high-pressure cylinders for use during energy shortages.

The high pressure electrolyzer can operate with electric power with standard parameters, or from renewable energy power plants with non-standard parameters. The advantages of the proposed electrolyzer are its ability to generate hydrogen under high pressure and to provide compact storage. The innovative electrolyzer design is based on the use of chemically active electrodes, simplicity in mounting and servicing, as well as reliability and safety.

As part of the project, implementers successfully developed the high-pressure electrolyzer prototype, which produces 1 m3 of hydrogen per hour, and the control modules to operate the electrolyzer. Because of the proprietary algorithms of the automatic control system, the project ensured the reliable and safe operation of wind power plant generators and, as a consumer of electric power, the high-pressure electrolyzer.

The use of this system in the industrial production of desalinated water, in conjunction with solar and wind plants, will create a significant reduction in fossil fuel emissions and minimize environmental pollution.

Project scientists made several trips to the United States to share their experiences and discuss the development of the prototype with colleagues at the CAP Monterey Bay Operations R&D Laboratory and CAP Holdings in Monterey, California. A small working model of the electrolyzer has been sent to the United States for testing. As a result, CAP Holdings is considering a partner project devoted to further improvements of the electrolyzer design.

A working prototype of the electrolyzer developed during the project

COMPLEX DYNAMICS OF QUANTUM DOT LASERS AND AMPLIFIERS

Participating parties:
Funding amount: $24,665

Scientists recently devoted considerable attention to the phenomena of self-organization and chaos because of their fundamental and applied interests. From an application point of view, chaos-based communications (CBC) has become an option to improve privacy and security in data transmission. Quantum dot lasers with double and multiple cavity feedback are the key elements for optical CBC systems.

The STCU Project 5993 obtained an adequate model for quantum dot lasers under the influence of double cavity optical feedback (Fig.1). Numerical investigations show that under appropriate conditions, quantum dot lasers reveal chaotic behavior, appropriate for CBC (Fig.2). Under suitable conditions, two chaotic lasers can synchronize.

Project scientists extended a bifurcation analysis to the new photonic devices of quantum dot lasers under the influence of multiple feedbacks from external cavities (Fig. 3). The scientists found that with the Hopf bifurcation, which separates stable and unstable stationary solutions, they were able to identify the optimal conditions for chaos generation. Researchers made numerical simulations for estimations of delayed, perfect, and anticipated synchronization for distributed feedback (DFB) lasers with a passive dispersive reflector.

The conclusion is that these photonic devices are promising candidates for fast communications based on chaos, which can improve the privacy and security of data transmission.

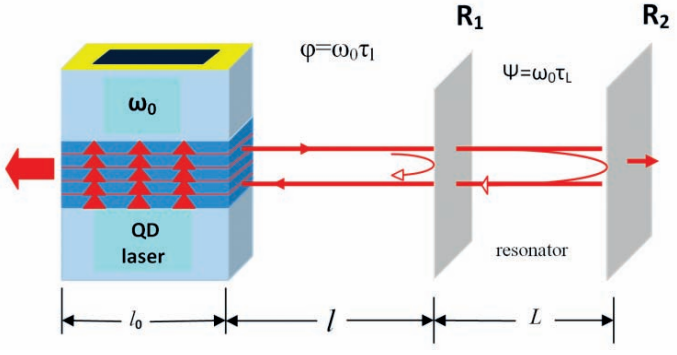


Figure 1. Laser setup

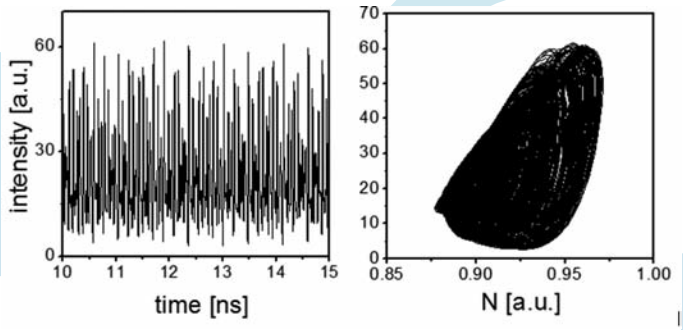


Figure 2. Chaotic behavior appropriate for chaos-based communications

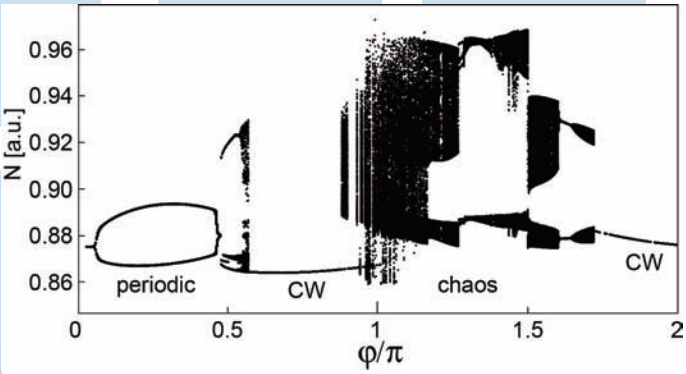


Figure 3. One parameter bifurcation diagram

2015 PROJECT ACTIVITIES

STCU SUPPORTS NEUTRON SOURCE FACILITY (NSF) IN KHARKIV

On 26 September, 2011, the U.S. and Ukrainian governments signed a Memorandum of Understanding on nuclear security cooperation. The MoU formalized the shared intent of the United States and Ukraine to implement fully the commitment made at the 2010 Nuclear Security Summit to work together to prevent proliferation and to secure all vulnerable nuclear material. At the time of the signing of the MoU, Ukraine announced its decision to get rid of all of its stocks of highly enriched uranium by March 2012, when the next Nuclear Security Summit was scheduled to convene.

The United States undertook to provide Ukraine with financial and technical assistance to help with elimination of the highly enriched uranium and to modernize Ukraine's civil nuclear research facilities. The United States is assisting with the conversion of those facilities to operate on safer, low enriched uranium fuel and is building a state-of-the-art neutron source facility in Ukraine. The $73 million investment made by the United States in this state-of-the-art facility will provide Ukraine with new research capabilities and the ability to produce industrial and medical isotopes for the benefit of the Ukrainian people.

The STCU was involved in a number of different projects to support the Neutron Source Facility, two (P601 and P515) of which are described below.

DEVELOPMENT OF TECHNOLOGY AND INDUSTRIAL EQUIPMENT FOR ASSEMBLY AND WELDING OF NEUTRON SOURCE

Participating parties:  

Funding amount: $2,500,000

The goal of STCU project P601 was for specialists from the E.O. Paton Electric Welding Institute to research and develop equipment capable of welding neutron source elements and units for the newly constructed Neutron Source Facility in Kharkiv, Ukraine.

The neutron-generating target is one of the main components of the neutron source, which consists of a SAV-1 aluminum alloy body containing W-Ta and U-Al panels. As part of the project, the team created an installation for the electron-beam welding KL-181 device. This installation permits high-quality welding of neutron-generating target body elements. The electron beam welding process is conducted in a high-vacuum chamber, which prevents melted materials from oxidizing. The improved welding thermal parameters minimize post-welding deformation of the product. The installation possesses a system for visual control over the welding process as well as a RASTR system which provides secondary electron images of welded areas for increased quality control. The custom software allows the control of different variables of the system: the vacuum, the electron beam trajectory, the welding modes, and the adjustment of the high-voltage power supply for the electron-beam gun.

Fig. 1. Installation for the electron-beam welding.
Fig. 2. Neutron-generating target body element.

As a result of this project, the E.O. Paton Electric Welding Institute manufactured and commissioned another installation of a plasmatron and a setup for automatic welding of uranium target panels. The plasmatron installation allows the deposit of protective coatings on graphite elements of a setup for uranium melting necessary for the production of target panel cores. The commissioning of the installation for the automatic welding of aluminum and uranium elements allows the conduct of high-quality argon-arc welding of the uranium target elements. The E.O. Paton Electric Welding Institute welded over the perimeter of the elements in an uninterrupted mode. The control unit of the installation allows conducting adjustment and welding operations either in automatic or manual mode. The support of American collaborators and the STCU helped NSC KIPT to obtain the installations for metal cutting and welding required for the development of critical units, which allow the replacement and repair of the Neutron Source Facility.

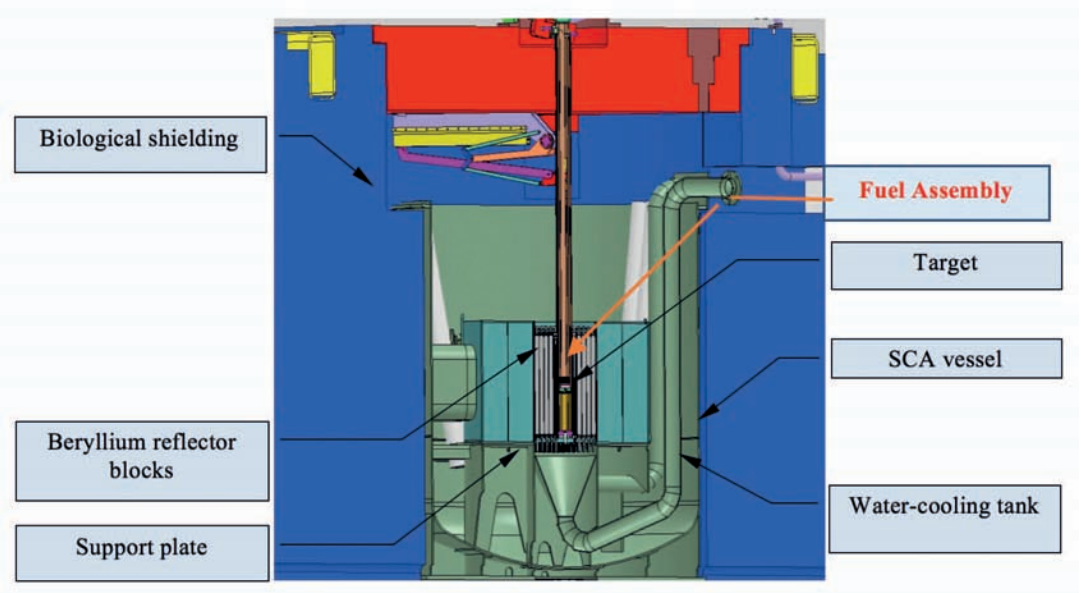
DEVELOPMENT OF FUEL ROD AND FUEL ASSEMBLY DESIGN AND MANUFACTURING TECHNOLOGY FOR THE SUB-CRITICAL ASSEMBLY, AND THEIR TESTING TO SUBSTANTIATE THEIR RELIABILITY AND SAFETY

Participating parties:
Funding amount: $580,000

The Kharkiv Institute of Physics and Technology, together with the U.S.-based Argonne National Laboratory (ANL), through the STCU Partner Project P515, developed and constructed a research nuclear facility – a "Neutron Source" facility based on an accelerator-driven sub-critical assembly (Fig.). For this facility, the team loaded WWR-M2-type fuel assemblies into the sub-critical assembly core for the first time. To replace the fuel in the core of the neutron source sub-critical assembly, the project developed an alternate fuel assembly design providing enhanced safety and reliability. In collaboration with ANL, a fuel material study, a structural materials study, and a technology for manufacturing fuel rods were developed to create the possibility for a substantial increase in the achievable specific fissile fuel content, as compared with the reference WWR-M2 fuel. The project developed the engineering design and detailed design for manufacturing of a pilot FA-Kh (Fuel Assembly – Kharkiv) which can be used in the sub-critical assembly. This alternative FA-Kh design is composed of six fuel rods with E110 alloy cladding and UO2 fuel pellets.

Additionally, the fuel pellets and fuel rods developed for the FA-Kh design permits a four-to-five times increase in specific fissile fuel content in the fuel rods. Therefore, the FA-Kh fuel assemblies may be utilized in other Ukrainian research reactor cores (after corresponding modifications of the design, due to the specific operating parameters of each reactor), specifically, in the WWR-M research reactor of the Institute for Nuclear Research (INR) in Kyiv.

General View of the Sub-Critical Assembly



2015 PROJECT ACTIVITIES

REGIONAL COLLABORATION FOR ISTC/STCU FUKUSHIMA INITIATIVE PROJECTS

2011 - 2015

In 2015, STCU successfully completed the Fukushima Initiative to support environmental assessments, remediation, and long-term monitoring in the areas impacted by the nuclear power plant accident in Fukushima Prefecture, Japan.

Based on the historical body of knowledge gained during remediation of the consequences of the Chornobyl nuclear power plant accident, as well as from environmental monitoring of former nuclear test sites and other areas, ISTC and STCU facilitated the selection of targeted research projects designed to help Japan with remediation and long-term monitoring. In December 2011, the Initiative was created following meetings between CIS scientists and Japanese experts. In 2012, the STCU and ISTC issued a joint call for proposals for projects related to land contamination and monitoring in the Fukushima area and 59 proposals were collected at the STCU and 53 at the ISTC. U.S., EU, and Japanese experts independently reviewed these proposals, and six full forms were selected for funding in January 2013 - three at the STCU (5952, 5953, and 5954 from Ukraine), and three at the ISTC (2 projects from Armenia, and one from Kazakhstan).

The final ISTC/STCU Technical Review Committee meeting on the environmental assessment for long-term monitoring and remediation in and around Fukushima was held in Hitotsubashi University Hall, Tokyo, on November 5 - 6, 2015.

Please see page 8 of this Annual Report for more information about this meeting.

METHODOLOGY FOR LONG-TERM RADIATION MONITORING TO DOSE ASSESSMENT USING RADIOLOGICAL ZONING AND MODELING OF RADIONUCLIDES MIGRATION IN ENVIRONMENTAL AND FOOD CHAINS

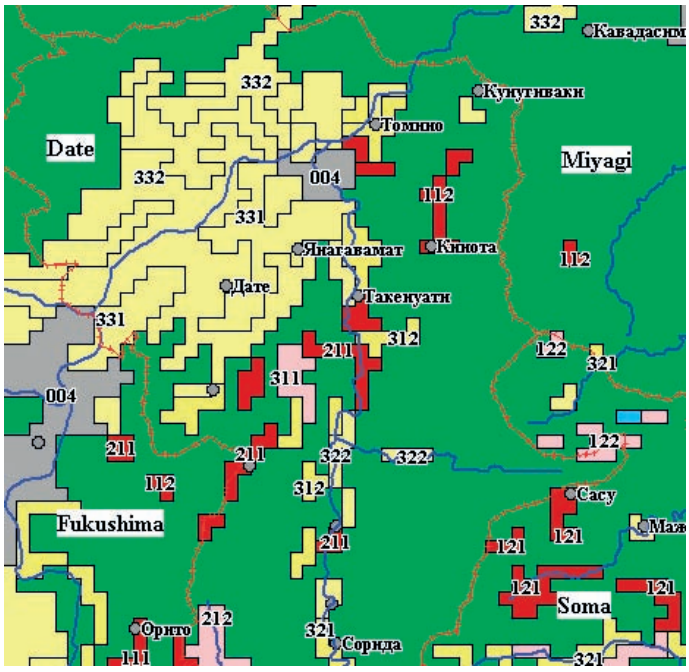
Participating parties:

Funding amount: $190,000

Within the framework of STCU Project 5953, the project team developed an integrated modeling methodology with an extensive database of soil-plant-food components and human radiation exposure for cesium and other radionuclides, based on knowledge and the experience of Chornobyl and other polluted areas. The researchers used this methodology to predict future conditions of agricultural products, optimal crops and to evaluate the effectiveness of countermeasures for Fukushima. It also predicted the potential impacts of re-contamination of farm products resulting from resuspension and subsequent deposit of cesium-containing soil by strong winds and tornadoes around Fukushima.

The predictions addressed soybean, buckwheat, and pasture grass which have high cesium contamination levels in some areas around Fukushima. The prediction for Date City in Fukushima Prefecture was compared with measured data.

This predictive methodology will be useful to Fukushima farm recovery efforts.



A map of comprehensive radio-ecological zoning of test site with assessment of potential criticality of selected areas

COMPACTION OF RADIOACTIVE WASTE PRODUCED BY DECONTAMINATION OF TERRITORIES POLLUTED DUE TO THE ACCIDENT AT FUKUSHIMA DAIICHI NUCLEAR POWER STATION

Participating parties:
Funding amount: $63,360

The primary goal of STCU Project 5952 was to assess the actual volume of contaminated structures, roads, forests, arable land and soil following the Fukushima Daiichi accident in order to recommend successful remediation and rehabilitation measures. As the interim storage of the removed radioactive materials and its disposal requires significant capital investment, the project proposed an approach for organic waste volume reduction by incineration, based on the use of Chornobyl incineration equipment tested in the Exclusion Zone. The cost of radioactive waste disposal was reduced due to the reduction in the volumes of primary radioactive waste. Waste was transformed into a form which is suitable for disposal, preventing ^{137}Cs migration into the environment. The IAEA is currently working with the Fukushima Prefecture Government to optimize incineration operating conditions by using an actual municipal incinerator in the Fukushima area.

Laboratory-scale pyrogasification Unit at Chornobyl

MONITORING OF RADIOACTIVE POLLUTION OF FOREST ECOSYSTEMS

Participating parties:
Funding amount: $250,000

The goal of STCU Project 5954 was the long-term forecasting of behavior and redistribution of ^{137}Cs in the components of Fukushima forest ecosystems and the possibility of using products from the polluted areas for the needs of the population.

Mushrooms are key indicators of radionuclide pollution in the forest ecosystem. Mushrooms-symbiotrophes deliver to plants water and mineral salts from the broad area where mycelium is spread. They are the maximum concentrators of ^{137}Cs in forest ecosystems; also they are a part of the human food chain. The project has created a novel model for prediction of ^{137}Cs migration from the soil into mushrooms. A conceptual scheme for the model includes soil migration processes and macromycetes peculiarities. The model is universal enough to be used at other radioactively polluted territories.

www.stcu.int

Ohgawara sampling site (Fukushima Exclusion Zone)

This project was conducted in close collaboration with Professor Y. Onda at Tsukuba University in Japan and involved sampling and evaluation of mushrooms in the Fukushima area.

2015 PROJECT ACTIVITIES

LONG-TERM COLLABORATION BETWEEN STCU AND US NATIONAL CANCER INSTITUTE

1997 - ONGOING

The Chornobyl Research Unit (CRU), Radiation Epidemiology Branch, Division of Cancer Epidemiology and Genetics, and the US National Cancer Institute (NCI), together sponsor joint US-Ukraine studies of the health effects of the Chornobyl Accident. NCI has funded and managed two concurrent, multi-decade scientific projects (studies of thyroid and leukemia outlined below) through a partnership agreement with the STCU in Ukraine since 1997. Under this agreement, the Institute of Endocrinology and Metabolism (IEM) and the Research Center for Radiation Medicine (RCRM) staff carry out the NCI-funded projects, while STCU provides project and financial oversight on behalf of NCI.

The projects are currently in their 19th year and are planned to continue for another two years.

UKRAINE-US SCIENTIFIC PROTOCOL FOR THE STUDY OF THYROID CANCER AND OTHER THYROID DISEASES IN UKRAINE FOLLOWING THE CHORNOBYL ACCIDENT

Total cost $ 5,685,663

A joint Ukrainian-American thyroid study involved thyroid screenings, thyroid dose reconstruction, and other related tasks in a group of approximately 15,800 people who were exposed to post-Chornobyl radiation fallout while under the age of 18 or *in utero*. Since 1998, group members have undergone periodic thyroid examinations in order to assess the radiation risks of thyroid cancer and other thyroid pathology in affected Ukrainians.

The aim of STCU Partner Project P004 is to assess early and late morphologic and functional changes in the thyroid glands of individuals exposed at a young age to radiation release as a consequence of the Chornobyl nuclear power plant accident. Under a rigid protocol approved by NCI, IEM staff carries out diagnostic thyroid examinations, including palpation, ultrasound scanning, thyroid hormones, and other laboratory tests. IEM or a mobile team conduct the examinations and refer group members to an expert endocrinologist at IEM for a fine-needle aspiration biopsy for diagnostic confirmation. Interview information collected by IEM regarding residential, health, diet, and lifestyle history is used by an international expert group involving NCI for reconstructing the thyroid exposure doses. IEM is responsible for tracking group subjects, recording medical and other data, data processing, database management, and organizing analytical data for NCI. IEM collects fresh and archived samples of thyroid tissue and blood for future large-scale epidemiological study of the full genome characterization of radiation-related thyroid cancer.

Ultrasound examination

The project results are widely used in the regulatory documents of the ICRP, WHO, and NCRP USA in the area of radiation protection of the population during accidents at nuclear facilities. UNSCEAR and BEIR (USA) have underscored the importance of the Ukrainian-American group study data in improving radiation risk models. The ARCH (Agenda for Research on Chornobyl Health) expert group, based on the current group study, recommends using this group in a long-term Chornobyl Lifespan Groups study. Japan used the project methodology and results to implement the long-term follow-up of the child population irradiated after the nuclear accident at Fukushima, Japan. Many leading international scientific journals have published the scientific results of the Ukrainian-American thyroid study.

UKRAINIAN-US SCIENTIFIC PROTOCOL FOR THE STUDY OF LEUKEMIA, LYMPHOMA AND OTHER HEMATOLOGICAL DISEASES AMONG CLEAN-UP WORKERS IN UKRAINE FOLLOWING THE CHORNOBYL ACCIDENT

Total cost $3,926,817

NCI and the Ministry of Health initiated a Ukrainian-American study on leukemia and related diseases in clean-up workers in Ukraine, aiming to assess leukemia risks after exposure to ionizing radiation during emergency and clean-up activities following the Chornobyl catastrophe in 1986-2006. NCI and RCRM later expanded this study of thyroid cancer among Chornobyl's clean-up workers.

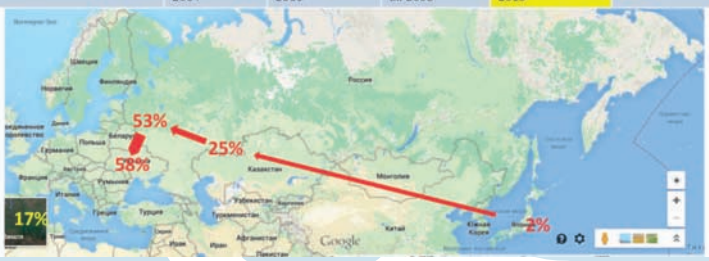
The leukemia project (STCU Parter Project P003) implemented a case-control study in a group of 110,645 male clean-up workers.

The project team applied a uniform modern dosimetry method for assessment of red bone marrow doses along with their uncertainties for 1,000 study subjects (137 cases and 863 controls).

An independent international hematological review panel confirmed all cases based on medical records (100%) and biological materials (bone marrow aspirates/biopsy slides and/or peripheral blood smears 70%).

NCI-RCRM studies were first to show a connection between ionizing radiation and chronic lymphocytic leukemia

Cohort (number of subjects)	A-bomb Survivors (87,000; 50 yrs)	Techa (30,000; 52 yrs)	Belarus, Russia & Baltic	Ukraine (110.640; 20 yrs}	15-c0untry (400,000; 7 yrs)
Number of CLL cases (%)	6 (2%)	23 (25%)	21 (53%)	79 (58 %)	47 (17%)
Average cumulative recorded dose, mGy	300	300	-	91.3	9.4
Reference	Preston et al. 2004	Krestinina et al. 2010	Kesminiene et al. 2008	Zablotska et al. 2013	Cardis et al. 2007



The study confirmed a significant increase in leukemia rates during a study period of 20 years post-radiation exposure. Scientists observed the highest radiation risks during the first 15 years – a 3.44-fold increase per 1 Gray of radiation - findings consistent with studies of Japanese A-bomb survivors. One of the most important findings in this group was an excess of chronic lymphocytic leukemia rates due to radiation exposure. Besides the ionizing radiation, it has been found that exposure to petrol could also be a significant independent or compounding factor increasing myeloid leukemia risks, however exposure to petrol is not important for chronic lymphocytic leukemia.

Radiation Research, Environmental Health Perspectives, Environmental Research, Health Physics, and Hematological Oncology journals all published the main results of the project during the period of 2008-2016.

The first stage of the thyroid cancer study of clean-up workers is complete. The information basis for the analysis of dose-dependent risk estimates of thyroid cancer in a group of 152,644 male clean-up workers during the years 1986-2013 is currently in the process of formulation, with 262 cases of thyroid cancer identified to date. NCI and RCRM staff derived a new method of retrospective dose reconstruction (ROCKVILLE) based upon RADRUE. The total thyroid dose includes the following components, each of which is assessed separately: external exposure dose, internal exposure dose due to ingestion, and inhalation dose due to short-lived radionuclides. RCRM staff conducted interviews with 600 study subjects (150 cases and 450 controls) to gather further retrospective total dose reconstruction. According to the questionnaire data, RCRM specialists estimated the total thyroid dose in most interviewed subjects. RCRM is establishing an analytical database in order to determine the thyroid cancer risk among clean-up workers. The European Journal of Epidemiology published the results of this project in 2014.

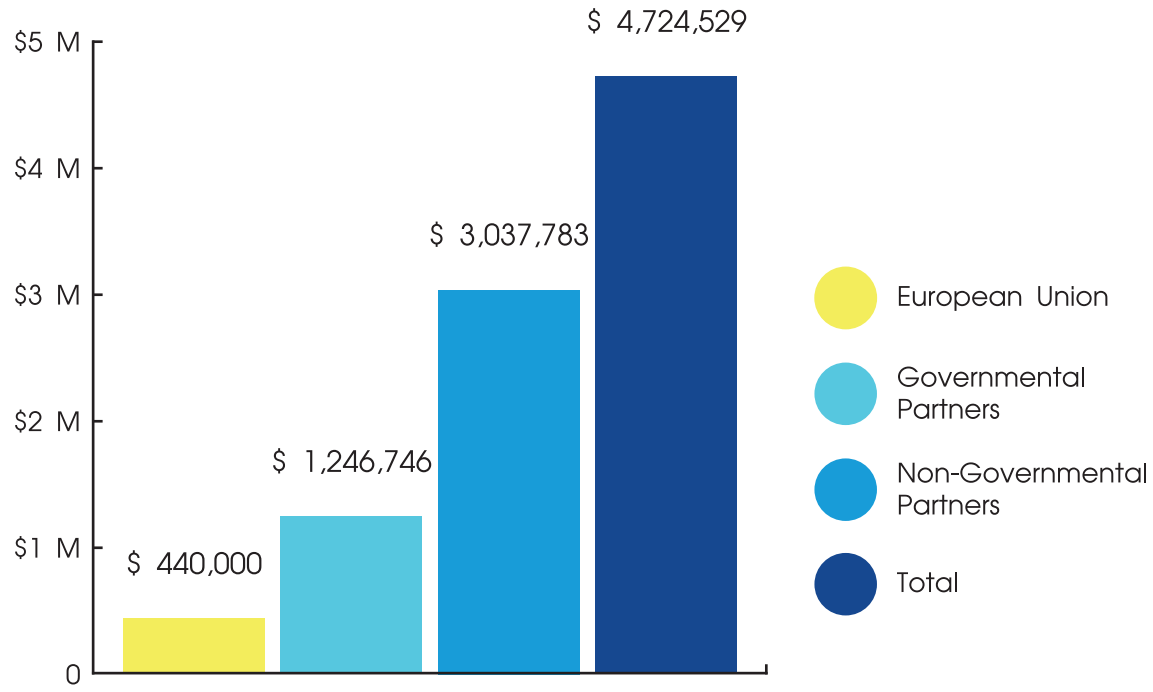
FINANCIAL ACTIVITY

2015 saw a substantial decrease in the amount of new STCU project funding compared with 2014. In 2015, the STCU Governing Board approved just over $4.7 million in new projects, a decrease of approximately $9.4 million in total new project funding compared with 2014. This considerable decline in total new project funding in 2015 was partly due to an administrative delay in 2015 Targeted Initiatives (TI) funding, which meant that about $1.5 million of funding was pushed into 2016. However, even accounting for the shift in TI funding, 2015 funding came in at a level not seen since the late 1990's at the STCU. 2016 funding is expected to rebound (helped in part by the shift in TI funding mentioned above) to approximately $8-$10 million; however, it is clear that funding levels in the near-term (next 1-2 years) will not return to levels seen in the recent past.

New partner project funding in 2015 slumped compared to 2014, but this was not surprising, as 2015 saw continued political turmoil in Ukraine. The $4.3 million of new partner project funding in 2015 was $2.1 million less than that received in 2014, and was on par with 2004 and 2005, when the amount of funding was $5.8 million and $4.5 million, respectively. In 2015, new project funding from all partner organizations represented 90.6% of the total amount of new STCU project funding. This percentage is slightly higher than the 80% of total funding the STCU has received from partner organizations in recent years.

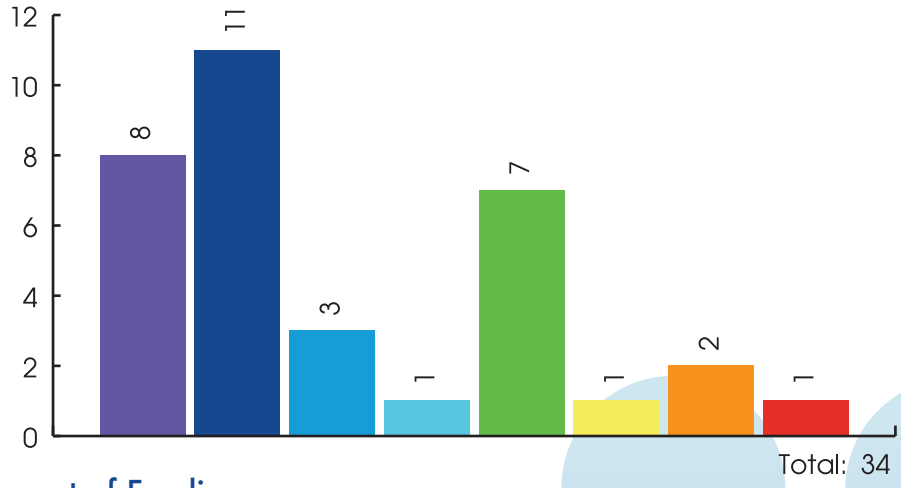
For the fourth time, external auditors from KPMG Baltics SIA audited the financial management and accounting systems, as well as the system of internal controls for both the operations of the STCU administration and STCU funded projects. The results of this audit can be found on the STCU's website at: www.stcu.int/documents/stcu_inf/reports/audit/2015/. Auditors identified some weaknesses in conjunction with the 31 December, 2015 financial statement audit. The Secretariat will correct the weaknesses during the course of 2016.

NEW PROJECT FUNDING IN 2015 BY SOURCE

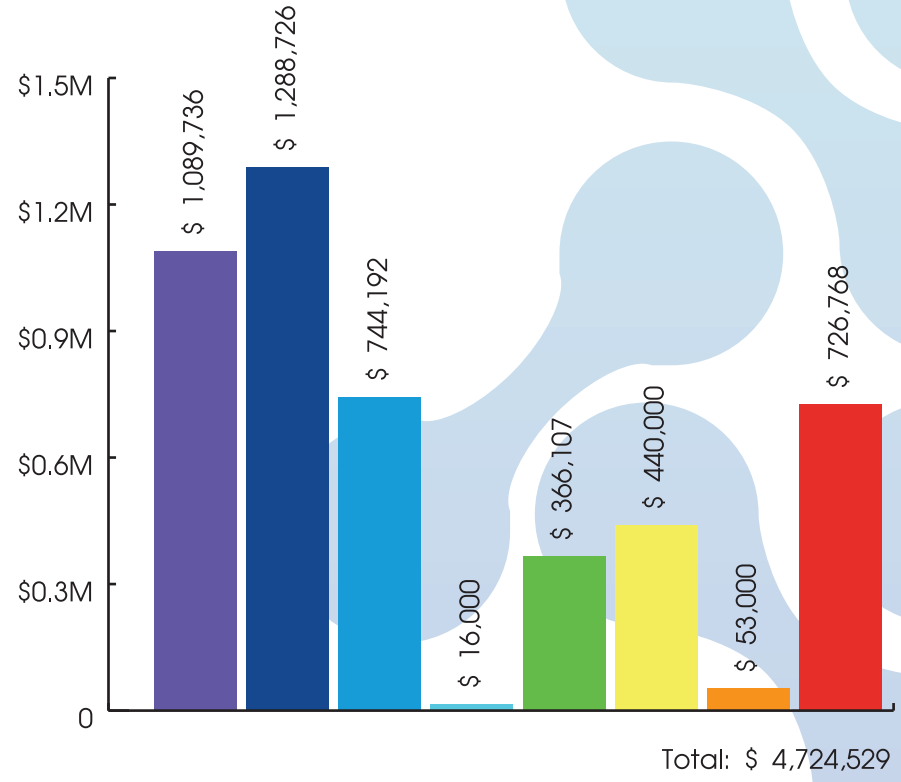


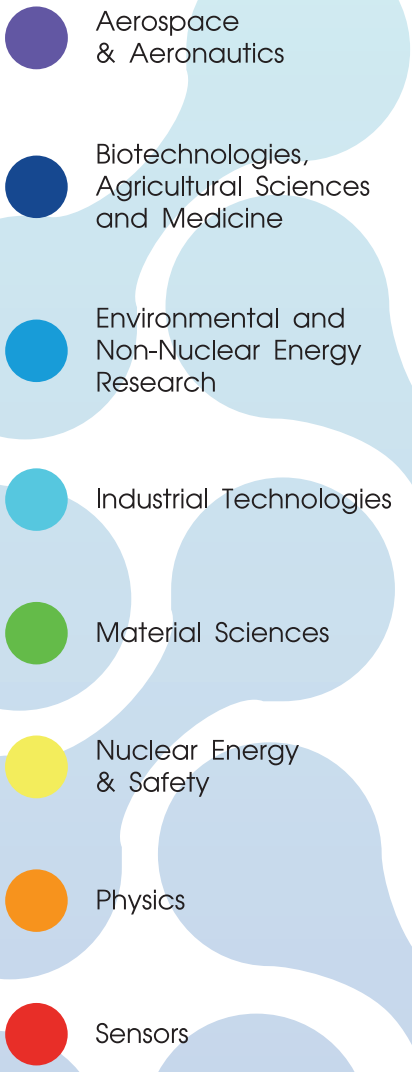
NEW PROJECT FUNDING IN 2015 BY PRIMARY TECHNICAL AREA

Number of Projects



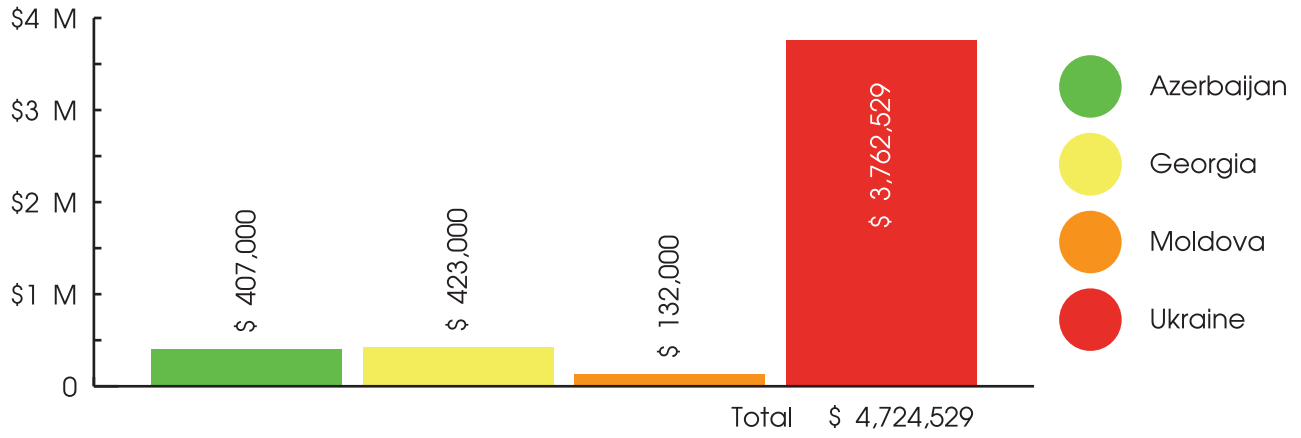
Amount of Funding



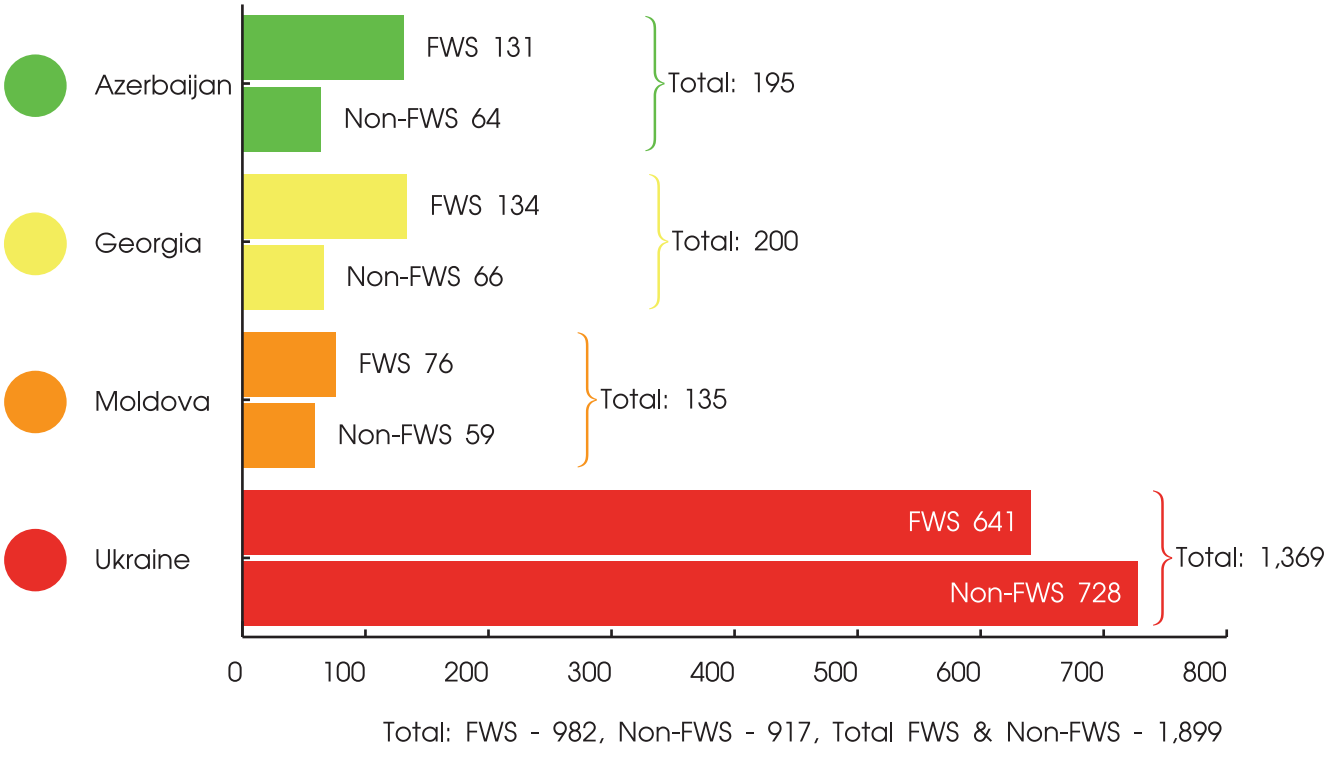


FINANCIAL ACTIVITY

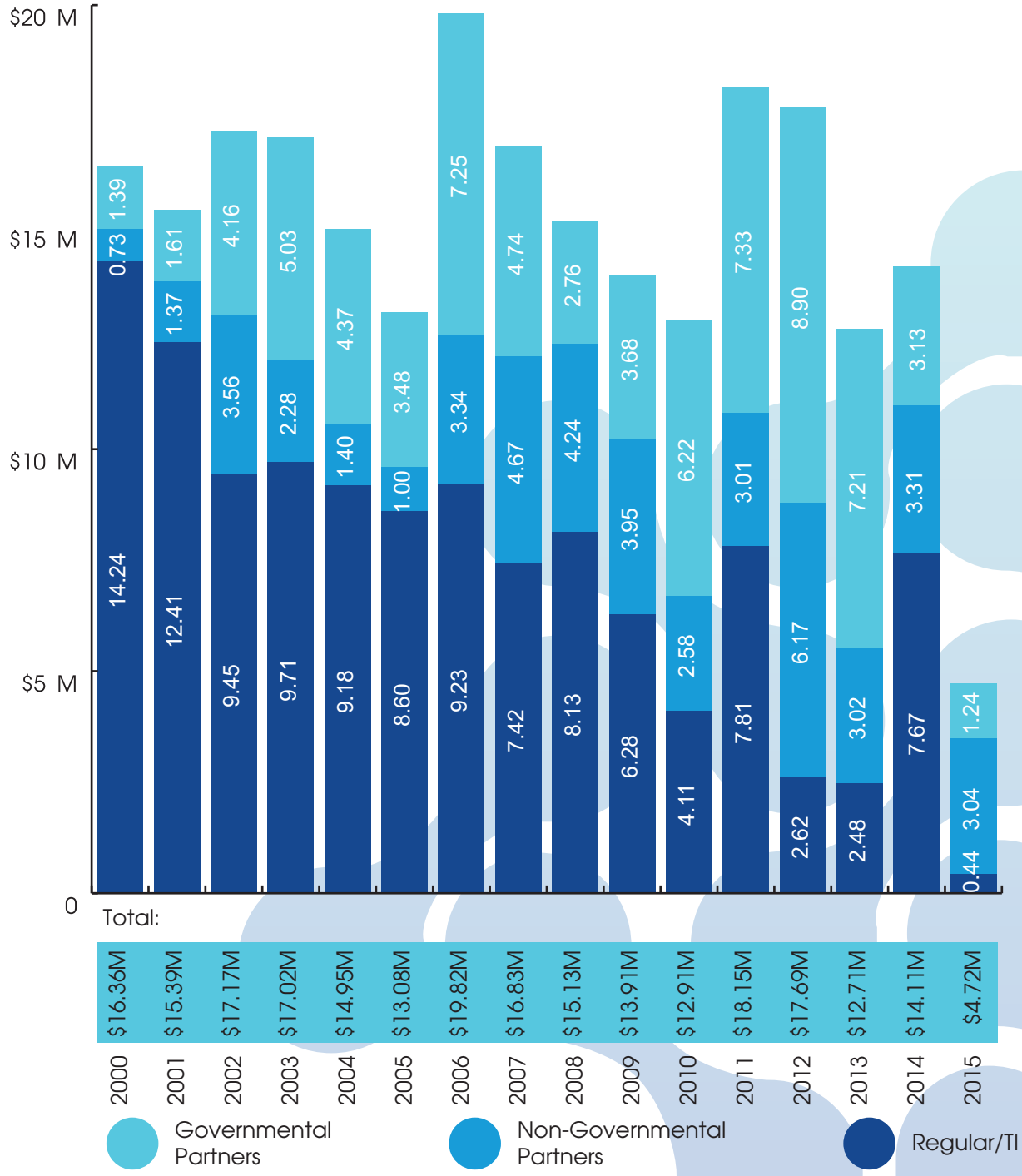
NEW PROJECT FUNDING IN 2015 BY LOCATION OF RECIPIENT ORGANIZATION



PARTICIPANTS REDIRECTED ON STCU PROJECTS DURING 2015 BY LOCATION OF RECIPIENT ORGANIZATION



REGULAR/PARTNERSHIP FUNDING, 2000-2015 (IN MILLIONS USD/YEAR)



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