

ISTC ANNUAL REPORT 2017 – MOVING FORWARD TABLE OF CONTENT

Statement of the Chairman of the ISTC Governing Board	2
Statement of the Executive Director.....	4
Overview of ISTC activities in tables	6
Main events of 2017.....	8
ISTC and the Astana Future Energy EXPO 2017	8
US-Georgia Partnership in Science Regional Training Workshops on NIH Grant Application Process and Procedures and Scientific Manuscript Writing.....	10
Implementation of the International Scientific Conference "The Role of Young Scientists in the Development of Science, Innovation and Technology"	10
Participation in the Bio-Japan 2017 Exhibition.....	11
Presentation on ISTC Activities by David Cleave at FNCA.....	12
Notable projects of 2017	13
TI Projects.....	13
Radiation Detection Training Center at the Middle East Scientific Institute for Security (MESIS) in Amman, Jordan	15
Equipping a Radiochemical Laboratory and Mobile Radiochemical Laboratory for Al Tuwaitha Nuclear Research Center Baghdad, Iraq	16
Target Initiative: CBRN Export Control on Dual-Use Materials and Intangible Technologies in Central Asia.....	16
EU-Funded Project 53 of the EU CBRN Centers of Excellence Initiative	18
New ISTC Partner in 2017 - APhL.....	20
MC 5.01/15B Project Support to Southern African States in Nuclear Safety and Safeguards.....	20
The SUNKAR Regional Radioactive Emergency Response Exercise.....	22
Project 60 support to the EU CBRN Centre of Excellence for Eastern and Central Africa in Nuclear Security.....	23
Regular and partner projects in 2017	25
List of completed projects.....	36
ISTC organizational structure	37
Contact information	37

STATEMENT OF THE CHAIRMAN OF THE ISTC GOVERNING BOARD

The international agreement to continue, transform and expand the International Science and Technology Center (ISTC) came into effect on December 14, 2017. Upon ratification by the constitutional processes of all Parties, this agreement establishes a strong legal and diplomatic foundation for a renewed and revitalized ISTC. The new agreement reflects the transformation of the Center into a modern, effective, and streamlined entity for cooperation on science and security in a rapidly changing and challenging world. We can truly say: “The new ISTC is open for business”.

Initially, most ISTC resources have been focused on applying science and technology to challenging legacies of the past, especially sustaining the existing scientific expertise of institutions and investigators during difficult economic disruptions. Today’s ISTC is focused on the future and on tackling the evolving challenges of our time. The Parties’ explicit goals guide our investments and initiatives are targeted to meet specific needs. The ISTC’s transformation and expansion, reflected in the new agreement, permits wider cooperation to meet emerging challenges to health, well-being, prosperity and security in a more interconnected world as the advance and spread of new technologies and materials is accelerated in our digital age.

Growth and cooperation are central to the ISTC’s transformation. The original ISTC brought together a select network of scientists and governments from Europe, Central Asia, Northeast Asia, and North America. Over a quarter of a century, the ISTC and its sister science center, the Science and Technology Center in Ukraine, involved more than 75,000 scientists from over a quarter of the countries of the world, engaging in groundbreaking research, innovative commercialization, formal training, and scientific conferences funded by the ISTC Parties. The new agreement opens ISTC to governments in other regions as well – and ISTC already has active projects in South Asia, Africa and the Middle East. Recently, scientists from nations across southern Africa participated in an ISTC support program on nuclear safety and safeguards, while 14 other nations, including Jordan, Pakistan and Afghanistan attended an ISTC workshop on strategic trade controls.

ISTC’s government Parties, through the Center, have extended participation to government agency



Partners and private industry Partners in member countries. The addition of public- and private-sector Partners, whose proposals must be approved by the government Parties, has increased activity, broadened the scope of research and provided additional resources. To succeed, ISTC has adopted the highest standards for management, operations and accounting, validated through independent audits by both governments and certified international professionals. In addition to encouraging best practices in responsible science, the ISTC has advanced best business practices in areas such as contracts, accountability and intellectual property.

The ISTC’s attractiveness to existing and future Parties, Partners and participants rests upon sound principles. The ISTC is an international organization in which governments engage in the operations of the Center and Parties act by consensus. Modern science and technology are multi-disciplinary, with centers of excellence spread around the world. Multinational scientific cooperation is the most effective way to strengthen technological sectors within the institutions and industries of each nation. Cooperative engagement in responsible science through the two science centers facilitates networking, promotes global security and strengthens the Parties’ scientific initiatives – in both the governmental and private sectors. Additional benefits come from the flexible and efficient funding mechanisms provided by the science centers, in some cases involving tax advantages.

The new ISTC operates based on true partnership and peer-to-peer respect. Today’s ISTC recognizes that no two participants have the same strengths and resources. For that reason, the new Agreement provides more flexibility to meet different needs. The ISTC’s continuation agreement provides that all ten Parties are equal members of the Governing Board. At the same time, it provides for nations whose needs are more limited or less clearly established to participate on a smaller scale, or on a trial basis. Observer status allows for a step-by-step approach to engagement that permits reassessment along the way.

Ratification by all Parties of the new ISTC Agreement at the end of 2017 was the heroic capstone to an energetic year of transition. After completing the relocation of ISTC’s headquarters to its temporary home on the campus of Nazarbayev University in

STATEMENT OF THE CHAIRMAN OF THE ISTC GOVERNING BOARD

Astana, Kazakhstan, the ISTC's Executive Secretariat further streamlined its operations and trained new staff. In parallel, ISTC continued its support for projects and programs, participated in the Future Energy EXPO-2017, achieved formal confirmation of ISTC's Privileges & Immunities, completed a draft statute and prepared for the January 2018 move into its modern business headquarters in Kazakhstan's capital. This places the ISTC headquarters, with strong host government support, in the very center of Eurasia, and symbolizes how many different nations have come together to pursue science and technology for the benefit of all.

On behalf of the Governing Board, I wish to congratulate all Parties for modernizing the ISTC and achieving ratification and entry into force of the new Agreement. Special appreciation must be extended to the President of Kazakhstan and to his government's ministers and officials who shepherded the new ISTC headquarters from a vision to reality. The Governing Board also recognizes that the Executive Director, the Secretariat, the branch offices and the Science Advisory Committee provide the day-to-day foundations for the Center's achievements. Ultimately, the ISTC's accomplishments are measured by the innovation and energy of the scientists, engineers, mathematicians and technologists we engage. They deserve the highest recognition, as do the ISTC Partners from government and industry. Together, we are catalysts for success. The ISTC is going strong, and is pleased to announce that, with a new and improved framework in place, the time is now right to expand cooperation in science, technology and security with new regional and global partners.



Ronald F. Lehman II
Chair of the Governing Board
International Science and Technology Center

STATEMENT OF THE EXECUTIVE DIRECTOR

We again saw a busy and productive year in 2017. Notably, new programs led us to venture into geographic regions that were new to the ISTC.

In 2017, the Parties and Partners provided more than \$7 million in funding for new projects and programs. With the support of EU DEVCO, the ISTC continued to implement new programs in Afghanistan, Jordan, Iraq, Mongolia, Pakistan, and Uzbekistan, as well as regional programs across Central Asia, and western, central, and southern Africa.

The ISTC's new Partners, the Association of Public Health Laboratories (APHL) and the University of Florida, provided an additional \$1 million for new programs in 2017. Standing Partners, including the DTRA and DEVCO, financed programs in the amount of \$3.5 million during the year.

The total cost of projects and program activities implemented in 2017 reached \$7.1 million, a continued growth trend from the transitional years. While the cost of regular projects was \$3.1 million, the lowest since 1995, Partner Projects amounted to \$2.4 million in recorded activities. Supplemental budget (SB) activities were valued at \$1.5 million. At the same time, the ISTC continued its commitment to efficiency and effectiveness, leading to a 23% reduction in the 2017 administrative operating budget (AOB) over 2016 levels.

In 2017, KPMG Baltics SIA issued a report on the ISTC's FY2016 financial operations. The external auditors noted in the Management Letter that "...the transition period for the ISTC is successfully completed. The employees possess necessary knowledge and experience to perform the requested tasks, as well to follow all the procedures. The information prepared for the audit purposes by the ISTC's employees is structured and accurate."

During 2017, several existing and new projects were the focus of much attention. The EU P53 project to strengthen the national legal framework and provide specialized training on bio-safety and bio-security continued into its second year in Central Asia, with regional meetings in Bishkek and Tashkent. Pakistan and Kazakhstan joined the project during 2017, and were involved in train-the-trainer workshops during October and November. These workshops attracted participants from six countries.

EU Project P60, in support of the EU CBRN Center of Excellence for Eastern & Central Africa in Nuclear Security, got underway with steering committee meetings in Nairobi, Brussels and Astana. In March, assistance from Project 60 aided the launch of the



African Youth Generation in Nuclear (AYGN) summit to foster collaborative efforts by national and international stakeholders in the region.

The MC.5.01/15B EU Project, which supports southern African states in nuclear safety and safeguards, began to provide support to the Southern African Development Community (SADC) to improve nuclear safety in Tanzania, Malawi, Zambia, and Namibia. The ISTC, in partnership with South Africa's national nuclear regulator, convened the inaugural meeting of project participants in Pretoria during September. Working with the Belgium Nuclear Forum,

the ISTC supported the AYGN Integrated Workshop on Nuclear Communication in November to address requests by participating countries for assistance in improving communication with communities on the route of uranium ore.

The ISTC teamed up for an EU CBRN-funded project with the Middle East Institute for Security (MESIS) in Amman, Jordan to tender and construct a radiation detection training center facility for MESIS. The US DoE/NNSA will, in coordination with MESIS, provide the equipment and delivery services for the training center. Construction, which got underway in November, will be completed by the end of March 2018.

In Iraq, another new EU-funded project provided equipment for a radiochemical and mobile radiochemical laboratory, in partnership with the Iraqi Ministry of Science and Technology (MIST). This central laboratory is to be located at the Al-Tuwaitaha Nuclear Research Center. A tender was completed in October and an evaluation in November saw the project awarded to a Jordanian company.

Still another new initiative started by ISTC during the year was the EU CBRN Export Control on Dual-use Materials and Intangible Technologies in Central Asia, which covered nine countries, with Kazakhstan's Ministry for Investments and Development playing a lead role. The first seminar took place in October 2017 and was well received. A second seminar is planned for May 2018.

Meanwhile, Targeted Initiative activities supported by US DoE/NNSA continue on several fronts. Notable among these are the Seismic Cooperation and Hazard Mitigation Monitoring, Nuclear Non-Proliferation, Security and Safety Capacity Building, and Radioactive Source Risk Mitigation programs, which are explored within this Annual Report.

Another U.S. Government Partner, the DTRA, commenced a new program activity: a CBEP

STATEMENT OF THE EXECUTIVE DIRECTOR

Laboratory Quality Management Training in Armenia. This 20-month project will closely assess and analyze human and veterinary laboratory staff competency, as well as laboratory systems and facilities in compliance with international regulations and guidelines. While programs expand and funding continues from the EU, Japan, and U.S. government Partners mentioned earlier, the U.S. Department of State (DOS) announced in June 2017 that it would be unable to provide new funding for the ISTC's operating, supplemental, and project budgets. However, the U.S. Party reiterated its unwavering commitment to the ISTC, and will continue to actively support the Center as an important conduit and mechanism to implement activities against CBRN threats. To smooth the transition, the U.S. DOS has dedicated funds to cover its share of ISTC operations in the near term, and longer-term funding solutions were discussed at the December 2017 Governing Board meeting.

A highlight of 2017 was the ISTC's involvement in Astana EXPO-2017, where Future Energy was a main theme. In cooperation with Nazarbayev University, the EXPO committee, and the Ministry of Education and Science, the ISTC provided logistical support and sourced 45 scientific experts, keynote speakers and four Nobel Laureates to participate in the forums over the three-month period of the EXPO. The event culminated with the high-profile presence at the final Expo Forum of two ISTC sourced Nobel Laureates – Prof. George Smoot and Dr. Rajendra Pachauri – who were involved with the drafting of the Expo Manifesto on results, actions, and recommendations from the 12 Expo Forums. These documents were presented to the EXPO committee and to Kazakhstan's president, Nursultan Nazarbayev. The ISTC's involvement proved to be a great success not only in meeting the needs of EXPO authorities, but also in raising the profile of the ISTC in Kazakhstan and other nations.

Concurrent with the EXPO and the Governing Board meeting (GB64) in Astana, the ISTC staged an EU CBRN Center of Excellence Regional Radioactive Emergency Response Exercise. Named "Sunkar" (from Kazakh "Falcon"), the exercise involved participants and observers from countries in Central Asia, the Caucasus, Africa and from Jordan. The exercise, supported by the Kazakh Institute of Nuclear Physics and Gumilyov National Eurasian University, included a table-top simulation exercise and on-site emergency response actions including detection and identification of radioactive sources and/or contamination areas.

A similar exercise is to be implemented in 2018 by the STCU in Georgia, with whom we continue to closely liaise and cooperate. For example, back-to-back governing board meetings were held during December 2017 in Frankfurt, Germany, allowing the boards to work side-by-side to address common challenges and explore new opportunities facing the respective Centers.

ISTC's Continuation Agreement, signed on 9 December, 2015 during the 61st Governing Board meeting, was finally ratified by all ISTC Country Parties on 14 December, 2017. With the Continuation Agreement fully in force, the Board and ISTC now have the ability to increase outreach activities moving forward. This demonstrates that the "new and improved" ISTC is open for business and can work to implement activities outside of its current regional focus, all with the aim of attracting more countries and partners to ISTC. Concerted efforts to target and engage with new countries and partners will be made in the coming year as an integral part of ISTC's outreach strategy.

I thank the Governing Board and all ISTC Party Representatives for their strong support, guidance, and commitment to the ISTC over this last year. With the ISTC Agreement now fully in force, we look to 2018 for further outreach and expansion, and the likelihood of new program activities and initiatives taking place, perhaps in new geographic regions.

I also thank the ISTC staff for their hard work and commitment throughout the year. This extends to staff in our Branch Offices, who continue to support and extend the ISTC's influence in the regions. In this respect, I offer a special mention of thanks to Mr. Vitaliy Kovalenko, who retired as Manager of the Kyrgyz Republic Branch Office at the end of 2017 after 21 years of service. He has been ably replaced by Ms. Dinara Kerimbaeva.

Moving forward, ISTC looks forward to another busy year in 2018, beginning with a move to new and larger offices. As our Chairman noted in his statement, "The new ISTC is open for business".



David Cleave
Executive Director
International Science & Technology Center

OVERVIEW OF ISTC ACTIVITIES IN TABLES

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2017 Project Funding - by source

	2017	1994-2017
EU (USD)	520,275	247,759,123
Japan	350,275	66,126,645
USA	-	229,905,216
Canada	-	35,302,224
Finland	-	1,185,960
Sweden	-	3,831,906
Norway	-	1,881,450
Korea	-	5,161,952
Partner *	4,257,467	290,334,101
Other	-	12,566,221
Total funds allocated (USD)	5,128,017	894,054,798

* Partner means non-governmental entities

2017 Project Funding - by beneficiary country

Country	No. of projects 2017	Allocated funds 2017 (USD)	No. of projects Total	Allocated Funds Total (USD)
Armenia	3	1,869,247	185	46,794,110
Belarus	0	0	100	27,481,454
Georgia	0	0	170	33,430,948
Kazakhstan	4	1,107,797	211	77,112,112
Kyrgyzstan	0	0	94	24,803,073
Russia	0	0	2033	667,127,177
Tajikistan	0	0	51	15,090,657
Ukraine	0	0	1	64,296
Jordan	1	250,000	1	250,000
Regional project	2	1,900,973	2	1,900,973
Total	10	5,128,017	2848	894,054,798

2017 Partner project funding and total partner funding - by country party

Country party	Type of Partner Company	Number of projects 2017	Partner Funding 2017 (USD)	Number projects Total 1994-2017	Partner Funding Total 1994-2017 (USD)
Canada	Total	0	0	5	622,456
	g	0	0	2	390,000
	n	0	0	3	232,456
European Union	Total	1	1,780,973	144	57,471,335
	g	1	1,780,973	83	45,829,875
	n	0	0	61	11,641,460
Japan	Total	0	0	65	8,469,857
	g	0	0	17	3,169,953
	n	0	0	48	5,299,904
Korea	Total	0	0	11	2,119,189
	g	0	0	7	1,780,000
	n	0	0	4	339,189
United States	Total	5	2,476,494	575	221,502,264
	g	4	2,108,428	541	214,746,236
	n	1	368,066	34	6,756,028
**Total:	Total	6	4,257,467	800	290,185,101
	GAP	5	3,889,401	650	265,916,064
	Non-GAP	1	368,066	150	23,969,037

OVERVIEW OF ISTC ACTIVITIES IN TABLES

Quantity of ISTC scientists

Country	Number of Scientists in 2017	Amount of Grant Payments in 2017 (USD)	Number of Scientists in 1994-2017	Amount of Grant Payments in 1994-2017 (USD)
Armenia	276	559,804.00	3,612	29,800,948.27
Belarus	0	0.00	1,868	15,923,194.38
Georgia	253	573,854.00	2,709	21,823,886.07
Kyrgyzstan	76	168,280.00	1,426	11,292,241.90
Kazakhstan	199	806,059.74	4,941	40,736,795.08
Russia	0	0.00	60,942	434,173,309.83
Tajikistan	212	574,865.00	776	8,194,360.24
Total	1,016	2,682,862.74	76,274	561,944,735.77

2017 Project Funding - by technology area

Tech area	No. of projects 2017	Allocated funds 2017 (USD)	No. of projects	Allocated funds total (USD)
Agriculture	1	514,731	95	35,947,296
Biotechnology	4	3,502,670	347	133,416,457
Chemistry	0	0	210	56,069,154
Environment	2	192,000	449	138,728,632
Fission Reactors	0	0	275	98,595,836
Fusion	0	0	52	15,622,334
Information and Communications	0	0	107	28,536,916
Instrumentation	2	550,550	138	37,725,405
Manufacturing Technology	0	0	75	21,412,969
Materials	0	0	219	70,026,612
Medicine	1	368,066	244	86,986,490
Non-Nuclear Energy	0	0	64	22,470,981
Other	0	0	18	2,798,135
Other Basic Sciences	0	0	30	6,859,930
Physics	0	0	420	109,012,928
Space, Aircraft and Surface Transportation	0	0	105	29,844,723
Total	10	5,128,017	2848	894,054,798

MAIN EVENTS OF 2017

ISTC AND THE ASTANA FUTURE ENERGY EXPO 2017

In 2016, Nazarbayev University, which had been tasked with organizing the Astana EXPO 2017, approached ISTC with a request for assistance. The university asked ISTC to review submitted project proposals in the Energy Best Practices area (eBP). ISTC's Governing Board granted the Secretariat approval and support in providing resources to the EXPO 2017, and a Memorandum of Understanding was signed with Nazarbayev University.

Kazakhstan and Astana, as hosts, chose Future Energy as the theme for EXPO 2017 to bring the global community together in response to global energy challenges.

ISTC's role during the EXPO 2017 was to source and provide logistical support for appropriate scientific experts, keynote speakers, and Nobel Laureates to participate in the Best Practices section and some of the EXPO 2017's 12 scheduled forums. EXPO 2017 events took place between June and September 2017.

To prepare for the EXPO 2017, ISTC's work included:

July 2016 –ISTC sourced 14 experts, who participated in five Expert Panels within the eBP Projects Competition in the following areas: a) Renewable and alternative energy; b) Energy efficiency and traditional energy; c) Energy storage; d) Energy distribution; and e) Using natural energy resources.

On 8 August 2016, ISTC signed a Memorandum of Cooperation for exhibition space during EXPO 2017. Kazakhstan's vice-minister of Foreign Affairs and national EXPO 2017 commissioner, Rapol Zhoshibayev was a signatory.

September 2016 - Five experts (three from the EU and two from Japan) participated as speakers at the EXPO 2017 Astana Forum held on 14 September.

ISTC visited the World Future Energy Summit in Abu Dhabi, 16-18 January 2017. ISTC took part in the 10th World Future Energy Summit in Abu Dhabi, UAE to support the Astana EXPO 2017 committee and Commissioner Zhoshibayev, helping to promote the Astana EXPO 2017. The Center provided two International scientific keynote speakers, Dr. David Renne, president of the International Solar Energy Society, and Dr. Herbert Girardet of the World Future Council and Club of Rome.

The Astana EXPO 2017 opened on 9 June 2017. In conjunction with the opening, the ISTC arranged a Special Day event on 14 June 2017 as part of the International Specialized Exhibition EXPO 2017 dedicated to the theme of Future Energy and Bio-Security.

The event was an opportunity to convey information about the latest developments in sustainable energy and offered a unique venue to participate in formal and informal discussions, facilitating the transfer

of knowledge between countries and their science communities.

The Astana EXPO 2017 was structured and organized in accordance with 12 themes: The energy revolution; Low-carbon technologies and renewable technology solutions; An international scientific and university conference; The socio-economics of a new energy model; General access to sustainable energy; Energy efficiency in the city: Urban planning, construction and transport; Energy for all: Challenges of a new time; Progress in reduction of CO2 emissions and achieving an energy efficient lifestyle; Renewable energy and quality of life; Energy solutions for climate change problems; International economy and policy in environmental protection; and Creating our future.

ISTC brought international expertise to the following events:

II series (10-11 July) – Low Carbon Technologies and Renewable Technology Solutions. ISTC Executive Director David Cleave, Vice Minister of Energy Dzhaksaliev Bahitzhan, and the president of the Green Academy of Kazakhstan, Dr. Yessekina Bakhyt gave opening speeches.

III series (12-13 July) –International Scientific and University Conference. The third conference at the Astana EXPO 2017 Future Energy Forum, in cooperation with Nazarbayev University and ISTC, called on the next generation of energy consumers and producers, up-and-coming scholars, researchers and young leaders to engage in energy innovation. Joined by leading scientists and experts, delegates forged new energy solutions and designed encounters, building networks and relationships vital to the future of energy. Aidyn Turebayev, ISTC Deputy Executive Director and president of Nazarbayev University, Dr. Shigeo Katsu, provided opening speeches. The event's primary audience included students from international universities.

VII series (08-09 August) –Energy for All: Challenges of a New Time. Renewable and sustainable energy is for everyone. This international event was centered on the question of how to advance the progress of energy security and sustainability. International cooperation and technology transfer were among the themes, along with training and education programs, micro-financing models and policy, and low-carbon NGO initiatives.

XII series (04-05 September) – Creating our Future. This 12th and final conference took place on 4-5 September and featured extensive interaction with the activities, visions, technologies, and interdisciplinary dialogue of the Astana EXPO 2017 Future Energy Forum. Current and former heads of state, Nobel Laureates, leading experts in science and industry – leaders of the

MAIN EVENTS OF 2017

world energy community - assembled to accumulate and exemplify the ideas, knowledge, and solutions developed throughout the Forum's 12 conferences. On 4 September, the 12th Future Energy Forum, *Creating Our Future*, was opened by representatives of the Republic of Kazakhstan, international politicians and scientists, Nobel laureates, and members of the International Steering Committee. The Future Energy Forum called on the world's nations to act.

By the opening of the Future Energy Forum, the steering committee – a network of high-profile Kazakh and international climate leaders and experts representing politics and science - provided valuable support in drafting the Astana EXPO 2017 Manifesto of Values and Principles, together with the findings of the series of conferences. Besides expert plenary sessions, keynotes, and workshops utilizing world-class experts, five work sessions dedicated to various aspects of the Manifesto took place during the two days. These were clustered around the main focal points of the past 11 Future Energy Forums, primarily New Business Models and Financing; Technology; Education, Participation and Collaboration; Urban Future and Mobility, and Transparency and Participation – Politics, Economy and Power. National and international experts, as well as public representatives, shared expertise on topics before entering a lively and focused discussion. The draft Manifesto was discussed during each working session as well, benefiting from the opportunity the Astana EXPO 2017 offered to concentrate knowledge, expertise and experience from around the globe. The Future Energy Forum concluded with a validation of its principles and underlying foundations: a preview of the Astana EXPO 2017 Manifesto of Values and Principles. Together, they formalized the outlook and legacy of the Astana EXPO 2017 Future Energy Forum. In the closing ceremony on September 5, members of the Steering Committee, including Prof. Klaus Töpfer, founding director of the Institute for Advanced Sustainability



Studies (IASS), and Dr. Rajendra Pachauri, president of the World Sustainable Development Forum, delivered the Manifesto draft to Akhmetzhan Yessimov, chairman of the board at NC Astana EXPO 2017. These luminaries were all sourced by ISTC in support of the EXPO 2017.

ISTC was a main partner and sponsor of the final conference. ISTC brought Prof. George Smoot, **Nobel Laureate in Physics, from the United States**, and Dr. Rajendra Pachauri, president of the World Sustainable Development Forum, and a steering committee member, from India and a **Nobel Laureate of Peace**.

ISTC Executive Director, David Cleave, discussed energy challenges during the conference and took part in the final news conference, attended by Dr. Pachauri, Dr. Behjat al Yousuf, provost of the Masdar Institute in Abu Dhabi, and Dr. Baigarin.

During the news conference, David Cleave shared the level of ISTC involvement in EXPO 2017 activities. During the three months of EXPO 2017, ISTC was one of the main partners of the EXPO 2017 and Nazarbayev University. ISTC sourced and provided 45 experts to the EXPO 2017, including 15 experts for the Energy Best Practices area (eBPa), five experts for the Future Energy Forum in Astana, an expert to participate in the Paris COP 2 Forum, seven high ranking international experts and keynote speakers, including five Nobel Laureates, plus 12 international experts, including scientific experts for ISTC's Special Day.

The ISTC's work was applauded by the EXPO 2017 Committee and the Ministry of Education and Science, as mentioned during the speech by the director of the EXPO 2017 content department, Marat Ospanov, as well as by Dr. Kanat Baigarin, and the Kazakh Energy Ministry.



*Aidyn Turebayev,
ISTC Deputy Executive Director*



*ISTC Executive Director David Cleave;
Vice Minister of Energy Dzhaksaliev
Bahitzhan; and Dr. Raewon Chung,
Nobel Laureate of Peace*



*ISTC Executive Director David Cleave
speaks on energy challenges*

US-GEORGIA PARTNERSHIP IN SCIENCE REGIONAL TRAINING WORKSHOPS ON NIH GRANT APPLICATION PROCESS AND PROCEDURES AND SCIENTIFIC MANUSCRIPT WRITING

Tbilisi, Georgia May 1-5, 2017

NIH/NIAID, ISTC and the Georgian AIDS Center held three workshops in Tbilisi, Georgia on May 1-5, 2017: NIH Grant Application Process and Procedures, on May 1-2, Manuscript Writing Procedures, on May 2-3, and Manuscript Writing and Hands-On Training, on May 4-5.

The events were funded by NIH/NIAID and ISTC, with major support from the Georgian AIDS and Clinical Immunology Research Center. Experts from the National Institute of Allergy and Infectious Diseases



(NIAID), National Institute of Health; University of California, San Francisco; Department of Public Health, San Francisco, familiarized the audience with topics including NIH/NIAID research funding opportunities, systems for award management and eRA commons overview, NIAID international engagement, the NIH grant application submission process, allowable and

unallowable cost issues, and scientific collaboration were highlighted during the NIH Grant Application Process and Procedures workshop.

The scientific manuscript writing training was primarily dedicated to issues including: The art of writing clearly; How to present data, tables and figures, results, and conclusions in an easy to understand style; and how to write successful titles, abstracts, and introduction sections.

The audience, comprised mostly of young scientists from Belarus, Georgia, Kazakhstan, Kyrgyzstan, and



Ukraine, learned to strengthen their knowledge on the topics presented. Discussions in small groups, as well as during one-on-one work with facilitators in different sections helped participants clarify and expand their knowledge.

Participants were awarded certificates of participation at the conclusion of the workshops.

IMPLEMENTATION OF THE INTERNATIONAL SCIENTIFIC CONFERENCE "THE ROLE OF YOUNG SCIENTISTS IN THE DEVELOPMENT OF SCIENCE, INNOVATION AND TECHNOLOGY" REPUBLIC OF TAJIKISTAN, DUSHANBE (11-12 MAY 2017)

An international scientific conference dedicated to "The Role of Young Scientists in the Development of Science, Innovation and Technology" was held on 11-12 May 2017 at the Serena Hotel in Dushanbe, Tajikistan. The conference was conducted with financial support from ECO Science Foundation (ECOSF) and the International Science and Technology Center.

The event was organized by the board of young scientists of the Academy of Sciences of the Republic of Tajikistan, and was attended by young scientists from

research institutes of the Academy of Sciences of the Republic of Tajikistan, the Ministry of Education and Science of the Republic of Tajikistan, representatives of the Board of Young Scientists of the Council of Young Scientists at the Armenia National Academy of Sciences, the Council of Young Scientists at the Foundation of the First President of the Republic of Kazakhstan - Leader of the Nation, the Council of Young Scientists at the Moldova Academy of Sciences, the Council of Young Scientists at the Azerbaijan National Academy of Sciences, and representatives of the Young Scientists of the Republic of Pakistan.

MAIN EVENTS OF 2017



More than 100 young scientists attended the conference. Among them were employees, graduate students, and undergraduates. The conference's composition reflects the broad range of researchers and experts in: Biology and Medicine; Chemical-technological and technical innovation, and geology; Humanitarian sciences; and Economic development.

The board of the conference prepared a collection of more than 140 works, with articles grouped into sections reflecting the scientific directions of the conference.

The meetings were attended by 52 speakers - not only young scientists, but senior colleagues as well. Most of the reports corresponded to the topics of the conference, noting the relevance, scientific novelty, practical value, and the practical experience in addressing problems in each area of enquiry. The reports, accompanied by inspiring presentations, generated questions from the audience.

The second day brought a roundtable discussion on cooperation between Young Scientists of the various CIS countries and Pakistan.

Following the roundtable, representatives of the councils signed agreements. Included were: a Memorandum on Cooperation between the Board of Young Scientists of the Academy of Sciences of Tajikistan and the Board of the Council of Young Scientists at the Foundation of the First President of the Republic of Kazakhstan; a Memorandum on Cooperation between the Board of Young Scientists of the Academy of Sciences of Tajikistan and the Board of the Council of Young Scientists at the Armenian National Academy of Sciences; and a contract of cooperation between the Institute of Geology, Aseismic Construction and Seismology of the Academy of Sciences of the Republic of Tajikistan and the Institute of Geophysics and Engineering Seismology at the Nazarov National Academy of Sciences of the Republic of Armenia.

Mamadyusufova Menu, Ph.D., chairman of the Council of Young Scientists of the Academy of sciences of the Republic of Tajikistan organized this conference.

PARTICIPATION IN THE BIO-JAPAN 2017 EXHIBITION



Saumal Exhibition

Researchers from the Astana National Laboratory (NLA) on the basis of Nazarbayev University presented their Saumal and Bahra products at their booths during the Bio-Japan 2017 exhibition. The exhibition took place at Pacifico Yokohama in Japan from 11-13 October 2017. Several international companies showed interest



Bahra Exhibition

in mare's milk and made appointments to discuss future partnerships. Researchers also presented the products at the Embassy of Kazakhstan in Tokyo. During the meeting, important aspects of commercialization were noted and meetings with Japanese companies were scheduled to take place during a subsequent visit.

MAIN EVENTS OF 2017

Two presentations were made during the exhibition. The Astana National Laboratory presented informative talks on mare's milk and on Bahra concentrated grape polyphenols, a nutrient high in antioxidants and anticancer properties beneficial to all, especially infants. Local companies showed interest in mare's milk as well.

Participation in the Bio-Japan exhibition was successful and productive, resulting in new opportunities. Samples of Saumal and Bahra were distributed to exhibition visitors and participants.

For almost two decades, Bio-Japan has played

an important role in facilitating interaction between Japanese and global companies and organizations, and in stimulating new business opportunities.

Top business development, licensing, and alliance management professionals, R&D personnel, and biotech company executives from around the world gathered in Yokohama in October 2017 for the 19th Bio-Japan exhibition. Over 900 organizations from 30 countries participated in the event, where an anticipated 8,000 business meetings were held over the course of the three-day event.

PRESENTATION ON ISTC ACTIVITIES BY DAVID CLEAVE AT FNCA



David Cleave Presentation



FNCA Participants



Questions and Answers

David Cleave introduced ISTC during a presentation at the 18th Forum for Nuclear Cooperation in Asia (FNCA) meeting in Astana on 10 October 2017.

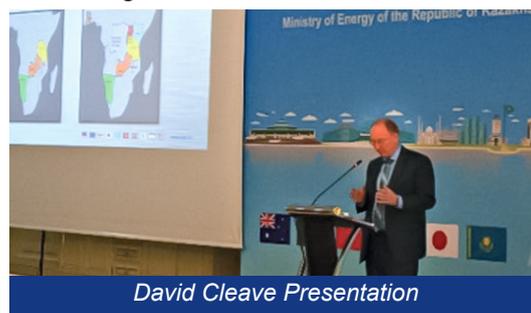
FNCA, originally the International Conference for Nuclear Cooperation in Asia (ICNCA), was established in March 1990 by Japan's Atomic Energy Commission, a date coincidental with ISTC's own establishment. FNCA was founded to promote cooperation with neighboring Asian countries in the field of nuclear energy. Under this framework, views and information are regularly exchanged, most notably: The utilization of radiation by industry, the environment and medicine; Research reactor utilization; Nuclear safety; and nuclear infrastructure. Presently, under the FNCA framework, a dozen nations (Australia, Bangladesh, China, Indonesia, Japan, Kazakhstan, the Republic of Korea, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam) are working together to achieve its objectives.

David Cleave spoke of the collaboration between ISTC participating countries for nuclear non-proliferation, and stressed EU initiatives like CBRN (Chemical, Biological, Radioactive and Nuclear), COE in Central Asia, and Project 53, an effort to strengthen legal framework and training on biosafety and biosecurity. He also focused on Project 60, which is dedicated for nuclear safety and nuclear security in southern African nations and beyond.

ISTC plans to work through FNCA to collaborate with Asian countries interested in nuclear safety and security by sharing its experiences on projects and providing training that enhances the use of nuclear energy for

peaceful purposes and implementing safeguards. ISTC stresses the value to Asian countries of networking with specialists from EU member nations.

Questions emerged from the floor and David Cleave provided a detailed explanation of ISTC's scope of activities, including projects, support for specialist gatherings, mobility, and training, as well as how non-member states can participate with ISTC and its activities through observer status.



David Cleave Presentation

NOTABLE PROJECTS OF 2017

TI PROJECTS

Seismic Cooperation and Hazard Mitigation Monitoring

This is a U.S. DOE-funded Targeted Initiative jointly administered by the ISTC and the Science and Technology Center in Ukraine (STCU), building on a longstanding seismic collaboration in the Caucasus and Central Asia.

The Secretariat subsequently supported two ISTC Partner projects developed jointly with U.S. scientists.

The project agreement for the Caucasus Geophysical Transect project involved Armenia, Azerbaijan, and Georgia, and once the Partners signed the collaboration agreement with STCU, the project team began work on the project.

A second project is underway entitled Unified Seismological Bulletin and Probabilistic Seismic

Hazard Analysis project for Central Asia (KR-2398). The Secretariat provided logistical support for a project kick-off workshop held in Bishkek, Kyrgyzstan.

The planned project duration is three years. In addition, DOE is working with the ISTC and STCU to solicit a new Partner-funded project under the the ISTC Seismic Targeted Initiative and the STCU Seismic Targeted Research Program, with an emphasis on expanding regional availability of real-time broadband seismic data. Lawrence Livermore National Laboratory and Incorporated Research Institutions for Seismology (IRIS) experts have been identified as potential Project Collaborators.

Advancement of Nuclear Forensics Activities in Kazakhstan

The ISTC started developing this area in 2007, with the first Nuclear Forensics and Law Enforcement workshop, held in Dushanbe. Last year, ISTC renewed work on this Target Initiative by visiting the GUAAM countries' working sessions in Moldova and meeting with LLNL & DOE representatives at the IAEA conference.

As a result of these activities, the Institute of Nuclear Physics submitted a project proposal which has been funded by the Partner. The project will establish a national nuclear forensics library in Kazakhstan, which

will involve cataloging uranium ore concentrates and other nuclear materials in Kazakhstan and conducting exercises to query the library using blind samples. It is believed that Kazakhstan's ability to better characterize their own material holdings will greatly improve their nuclear security. Kazakhstan's Institute of Nuclear Physics (INP) is currently working in partnership with the Lawrence Livermore National Lab (LLNL) to assess upgrading certain equipment and providing training for personnel within INP.

Radioactive Source Risk Mitigation

Activities within this TI were funded by U.S. DOE, which involved kick-off engagement meetings in Atyrau and Astana involving ISTC, U.S. DOE Pacific Northwest National Laboratory (PNNL) scientists, regulatory officials from the Kazakh Ministry of Energy, academicians, oil and gas companies, and STCU branch offices in Azerbaijan and Ukraine. The meeting participants discussed and agreed on the importance of the security risks posed by small, mobile well logging sources. Furthermore, it was agreed to form a working group, led by a technical consultant, to perform country-specific technology status reports, the results of which would be presented at a government and industry workshop.

In Kazakhstan, the ISTC selected a local technical consultant and tasked it with analyzing industry questionnaire data, preparing a preliminary Technology Status Report, collecting available data on radiation sources in the geophysical investigation in Kazakhstan, compiling an overview of Kazakhstan's regulations applicable to radioactive source usage

by industry, and presenting these findings at a larger workshop. ISTC and STCU hosted a Radioactive Well Logging Source Risk Mitigation in ISTC and STCU Member States workshop on September 12-13 in Atyrau, Kazakhstan. This goal of the workshop was to bring together government and industry in countries belonging to ISTC and STCU in order to raise awareness of and discuss the options for mitigating the security risks of using radio-isotope based tools for oil well logging, including the possibility of replacing these tools with less-vulnerable technologies.

At the workshop, consultants from Kazakhstan, Azerbaijan, and Ukraine provided overviews of regional usage of radioactive sources in well logging, industry operational requirements and security measures, and industry familiarity with suitable replacement technologies. As a result of the workshop, the participants agreed on the value of reducing security risks associated with mobile well logging tools, and affirmed that close cooperation between all partners involved would strengthen these efforts.

Nuclear Non-proliferation, Security and Safety Capacity Building:

This TI provides subject matter expert (SME) and implementation support for nonproliferation and nuclear security and safety capacity building in areas including export control and safeguards.

Representatives of the ISTC attended the opening ceremonies of the NSTC in May 2017. In September, the ISTC participated in a trilateral (U.S./Japan/Kazakhstan) workshop to identify human resource development and technical capability needs at the NSTC and develop a plan to address the identified needs. ISTC supported the

U.S. DOE safeguards engagement activities, including provision of training equipment for the workshops and a software upgrade to facilitate safeguards measurements at an Armenian nuclear power plant.

ISTC provided support for a DOE/NNSA activity aiding the Committee for Atomic Energy Supervision and Control (CAESC) to develop a cybersecurity guidance document for nuclear and radioactive facilities. The ISTC contracted with Kazakhstan's Nuclear Technology Safety Center to coordinate this work.

Nonproliferation and Nuclear Training Metrics Good Practices Exchange Workshop

During the Chemical, Biological, Radioactive, and Nuclear Security sub-working group (CBRNWG) meeting of the G-7 Global Partnership working group meeting during February 2017, NNSA shared its recommendations on use of the Kirkpatrick model from a recent task force report on improving training performance metrics. Based on this recommendation, a Good Practices Exchange on Nonproliferation

and Nuclear Security Training Performance Metrics workshop was organized in Tbilisi, Georgia during August 23-24, 2017 by the ISTC and the Science and Technology Center in Ukraine (STCU), in partnership with the U.S. Department of Energy's National Nuclear Security Administration (NNSA) and the Middle East Scientific Institute for Security (MESIS).

MEXT (JP) and DOE (US) collaboration for supporting NSTC in Nuclear Security Training

A joint Japanese MEXT-U.S. DOE-funded targeted initiative to provide Train the Trainer sessions to nuclear experts for the new Kazakhstan National Nuclear Security Training Center (NSTC), based at the Institute for Nuclear Physics (INP) in Almaty. The Secretariat provided logistical and language support for a preliminary meeting for Human Resource development held at the Japan Atomic Energy Agency (JAEA), Tokai, Japan.

The ISTC provided support for several activities at the Kazakhstan Nuclear Security Training Center (NSTC), including:

A MEXT/U.S. DOE-funded visit by an NSTC delegation to the Japan Atomic Energy Agency Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (JAEA/ISCN), to discuss training center business and operations management with JAEA/ISCN management and staff;

Support for NSTC experts to visit Oak Ridge National Laboratory to collaborate on curriculum development for Fundamentals of Nuclear Material Accounting and Control course materials;

Support for NSTC experts to attend IAEA trainings and conferences;

Support to acquire and install vehicle and pedestrian radiation portal monitors at the NSTC;

ISTC attended the INP/NSTC opening ceremony on 12 May 2017;

U.S. DOE and JAEA/ISCN held Workshop on 26-27 September for discussing NSTC activities and a support plan; and

Supported a NSTC expert to participate in a JAEA/ISCN training course on Physical Protection System on 16-27 October 2017.

DTRA Program Activities in 2017

1 - Laboratory training in Armenia

ISTC was awarded a laboratory quality management training project in Armenia. Integrated Quality Laboratory Services (IQLS) has been selected as a contractor for this project due to its experience in conducting similar lab quality projects in Armenia. This 20-month project will involve a five-month inception period, during which the project team will closely assess and analyze human and veterinary laboratory staff competency, the laboratory system, and the laboratory facility's compliance with

international regulations and guidelines. During the inception period, human and veterinary training topics will be reviewed and presented to DTRA and MoH/MoA. Based on the findings of the laboratory capacity assessment and gap analysis, the project team will reproduce the findings and propose training activities for the remaining 15 months of the implementation period.

The project involves a 15-month implementation period, with five theoretical, four practical bench

NOTABLE PROJECTS OF 2017

level, and two train-the-trainer workshops for human and veterinary laboratory specialists. Training topics include Sample Lab Flow, Laboratory Quality Management, Laboratory Diagnostics, Staff Competencies in Laboratories, Biosafety and Biosecurity. After the training program has been fully implemented, it will be transitioned to the Government of Armenia and DTRA.

ISTC conducted kickoff meetings with DTRA stakeholders, the ISTC branch office and Government of Armenia officials to investigate the potential place to mobilize, install the project team, find a location, and review the planning for a potential training workshop in Armenia.

2 - Electronic Integrated Disease Surveillance System (EIDSS) attestation in Kazakhstan

The Defense Threat Reduction Agency's (DTRA) Cooperative Threat Reduction (CTR) program is designed to help countries eliminate nuclear, biological, and chemical weapons of mass destruction. Under

the CTR Umbrella Agreement with the Republic of Kazakhstan, the Cooperative Biological Engagement program (CBEP) was created to combat bioterrorism and prevent proliferation of biological weapons-related technology, pathogens, and expertise.

The ISTC-managed project aims to acquire the support necessary to implement, certify, and register EIDSS in the Republic of Kazakhstan. This includes:

Ensuring the functionality of the EIDSS software package on all EIDSS workstations;

Ensuring the functionality of the EIDSS network;

Ensuring that EIDSS users and EIDSS IT support personnel are properly trained; and

Ensuring government accreditation and registration (attestation) of the EIDSS system.

This project was on hold during 2017, however, in November ISTC received notice that it could restart activities. During a kick-off meeting held among project parties in Almaty in November 2017 it was decided to update the project implementation roadmap and get buy-in among the various parties.

RADIATION DETECTION TRAINING CENTER AT THE MIDDLE EAST SCIENTIFIC INSTITUTE FOR SECURITY (MESIS) IN AMMAN, JORDAN

The Middle East Scientific Institute for Security (MESIS) has long been involved in radiation detection and radiation detection training.

Same years ago, MESIS was approached by Jordan's Energy and Minerals Regulatory Commission (EMRC) with a proposal for a joint project. The National Nuclear Security Administration of the U.S. Department of Energy was interested in providing Jordan with Radiation Detection Portals (RDP) to be used for regional training.

Given that MESIS is the host of the EU's Middle East Regional Secretariat of the Centers of Excellence initiative (covering Jordan, Lebanon, and Iraq), the EU would also contribute to this project, and decided to commit funds with the ISTC to build a facility, after which the U.S. would install its equipment.

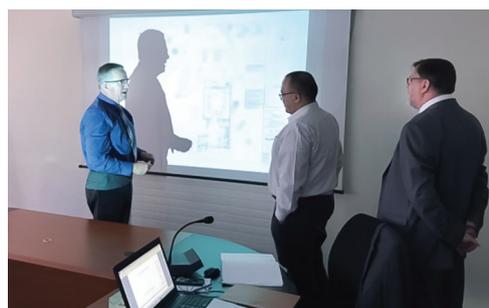
After conducting initial site assessments, it was decided that the Regional Training Center would be located on the campus of Jordan's Royal Scientific Society.

The inaugural meeting between MESIS, U.S.-based SES-Tech Global Solutions, supplier of the radiation detection equipment, and a local architect was held in May 2017 in Amman. During this



meeting, the site of the new training center was visited, architectural drawings of the building and technical specifications were reviewed, and a tender document which included a timeline was agreed.

Afterward, ISTC published an open tender for construction of the Radiation Detection Training Center on the ISTC and EU websites. By the deadline in September 2017, seven proposals had been submitted.



NOTABLE PROJECTS OF 2017

A meeting to evaluate the bids was held in September 2017 in Amman. In accordance with agreed procedures, the proposals were reviewed with SES-Tech Global Solutions and MESIS. An acceptable bidder with the best technical proposal and an acceptable price within the allocated project budget was determined.

The ISTC immediately began contract negotiations with the successful bidder, Amman-based Al-Subaihi

Contracting Company, and a contract was signed on 19 November 2017.

The construction company started site preparation in November 2017. By the end of 2017, excavation and other earthwork had been finished and a concrete foundation was started (see photos).

The Radiation Detection Training Center is expected to be completed by March 2018.



EQUIPPING A RADIOCHEMICAL LABORATORY AND MOBILE RADIOCHEMICAL LABORATORY FOR AL TUWAITHA NUCLEAR RESEARCH CENTER BAGHDAD, IRAQ

This project assists the EU, on behalf of the Iraqi Ministry of Science and Technology MoST, to extend the operational capabilities of the Iraqi Radioactive Waste Management System, and to provide instruments, tools, and accessories essential to the completion of a stationary radio-analytical laboratory. In addition, a mobile radiochemistry laboratory shall be delivered to enhance the detection capabilities of nuclear and other radioactive materials, quickly screen for Radioactive waste, and to conduct qualitative and quantitative analysis of Radioactive waste in locations other than the Al-Tuwaittha site.

The objective is to supply equipment to the Stationary Radiochemical Laboratory, accompanied by related services and the establishment of a Mobile Radiochemical Laboratory according to technical specifications, ensuring the characterization of radioactive waste, environmental monitoring, and personnel monitoring under the Iraqi Decommissioning Program.

After an unsuccessful tender in 2016, EU DEVCO assigned ISTC to provide project management and to conduct a new tender.

A kick-off meeting was held in March 2017 in Istanbul, Turkey, with representatives of Iraqi MoST and LOKMIS (Lithuania's former technical advisor from the EU side) specialists. The technical specifications were revised, and equipment was



divided into lots to attract more bidders. After tender documents were prepared and agreed, the tender was published in June 2017 on the ISTC and EU websites. An October 2017 deadline was set for proposals. A tender evaluation was held in November 2017, with Iraq's MoST, an EU Commission observer, and the ISTC participating. The technical proposals were examined and approved, with comments by the Iraqi representatives.

As the financial proposal was higher than the project's allocated budget of EUR 2.9 million, the Iraqi side asked for time to review the list of equipment and to reduce the list to bring the costs into line with the budget.

Finally, the ISTC prepared a draft contract and sent it to the Iraqi End User MoST and the EU Commission for approval, then initiated negotiations with the Iraqi contractor, the Al-Murbat Company.

TARGET INITIATIVE: CBRN EXPORT CONTROL ON DUAL-USE MATERIALS AND INTANGIBLE TECHNOLOGIES IN CENTRAL ASIA

In 2017, ISTC began implementing a new strategic export control project. ISTC participated in activities in Astana under the EU CBRN CoE Project 38 “Export Control Outreach for Dual-Use Items in Jordan and Kazakhstan”, with an industry outreach seminar on 1 March, and a regional conference on 21 June. These events were inaugurated by EC DEVCO Deputy Director General Marjeta Jager.

Expanding the accumulated experience in Kazakhstan, both in content and in scope, ISTC began implementation of a new strategic trade control project in Central Asia and adjacent regions, covering Afghanistan, Armenia, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, and Turkmenistan. The project’s objective is to engage the academic community in the CBRN area of knowledge involved with intangible technology transfers and in the education and training of export control professionals.

At the same time, the project stimulates and helps participating countries to build their own legal frameworks, policies, and administrative capacities to fulfil international obligations under export control regimes.

ISTC is well-positioned to implement the project, drawing on its achievements and experience in Central Asia and the Caucuses, and using its regional branches in Yerevan, Tbilisi, Bishkek, and Dushanbe. ISTC is also capable of combining export control and other non-proliferation projects (e.g. in nuclear or biological security) that are conceptually and practically linked.

The activities under the project are organized in several work packages, namely:

- Project Management (WP 1);

- Awareness raising on CBRN Export Control in academic and research communities (WP 2);

- Developing university courses for government officials (WP 3);

- Organizing a Ph.D. grant competition for students from participating countries (WP 4);

- Creating a network of potential beneficiaries from the services of the Identification Centre at Kurchatov in

Kazakhstan, and enhancing capacities identification of chemical and biological agents (WP 5); and

- Provision of support for the outreach to the relevant industries, including for the introduction of internal compliance systems (WP 6).

The project aims to achieve outcomes including: Increased knowledge about CBRN threats and non-proliferation in the region’s research communities; Establishing a platform for the exchange of opinions by academics, industry sector specialists, and export control authorities; Create and achieve consensus on a document presenting the regional scientific perspective on CBRN non-proliferation; develop proposals for university level postgraduate educational courses; establish, beginning from 2018, an annual Ph.D. grant for students from participating countries; create a multilingual database containing information on local industry products and companies that import or export dual-use materials and technologies; create a multilingual handbook containing information on the local industry, and export controls systems; and establishment of a self-sustainable network of academics to discuss the impact of new technological developments and publish them in a bilingual magazine.

The first seminar, Export Control on Dual-Use Materials and Technologies in Central Asia, took place in Astana, Kazakhstan on 12-13 October. It was organized by ISTC, EU P2P, and the Ministry of Investments and Development of the Republic of Kazakhstan. Representatives with various types of expertise from participating countries discussed the project concept and provided feedback on the optimal way to make it operational, taking the state of export control systems in the invited states into consideration and recognizing the need for regional harmonization. The next seminar, dedicated to the challenges arising from technological advancement, is scheduled for May 2018. We seek to enhance interactivity by augmenting the plenary sessions with specific workshops for the government, academic and research communities, and industry.



EU-FUNDED PROJECT 53 OF THE EU CBRN CENTERS OF EXCELLENCE INITIATIVE

Project 53

In December 2015, the European Union signed an agreement with the ISTC for the implementation of Project 53 (P53) of the EU Chemical Biological Radioactive and Nuclear Risk Mitigation Centers of Excellence initiative (EU CBRN CoE). P53, titled 'Strengthening the National Legal Framework and Provision of Specialized Training on Bio-Safety and Bio-Security in Central Asian Countries', was originally funded for EUR 5 million, but in November 2017 the budget was increased to over EUR 6.5 million after additional partner countries joined the project. P53 extends for 36 months, from December 2015 through December 2018.

P53 partner countries are the Islamic Republic of Afghanistan, the Republic of Kazakhstan, the Kyrgyz

Republic, Mongolia, the Islamic Republic of Pakistan, the Republic of Tajikistan and the Republic of Uzbekistan.

Implementation of P53 is broken down into seven work packages (WP's):

- WP1: Assessment and harmonization of national legislations in biosafety and biosecurity in accordance with international regulations (Biological and Toxin Weapons Convention, International Health Regulations, and the *Codex Alimentarius*), including regional emergency response, all with the aim of coming to an "One Health" system;
- WP2: Organization of national and regional awareness-raising events to sensitize political and executive bodies from the participating countries to biosafety and biosecurity issues;



- WP3: Identify and evaluate existing national and regional training capabilities;
- WP4: Assess facilities dealing with bio-hazardous materials to target training in each participating country and procurement of biosafety and biosecurity equipment and consumables;
- WP5: 'Train the Trainer' activities and other educational events to introduce the biosafety biosecurity culture;
- WP6: Train technical, scientific and other professionals involved in biosecurity and biosafety; and
- WP 7: Strengthen regional cooperation and integrate delivered training programs within existing national and educational programs.

Technical support is provided by an EU Team of Experts consisting of Sustainable Criminal Justice Solutions (SCJS), Public Health England (PHE), Verification Research, Training and Information Centre (VERTIC), and the Dutch National Institute for Public Health and the Environment (RIVM).

In 2017, ISTC continued its implementation of EU CBRN CoE Project 53. One key development was an increase in the number of partner countries from five to seven nations. Kazakhstan formally joined P53 in April 2017, and Pakistan joined in July 2017.

Working closely with each partner country's National Team of Experts (NTE) and the EU Team of Experts (ToE), work packages were implemented:

WP 1 (Legislative Harmonization)

A key component to improve the overall biosafety and biosecurity situation is to have comprehensive legislation and regulations that address all aspects of the issue. This is supported within P53 by assessing legislation and identifying areas ripe for improvement. As a first step, assessment of national legislations according to the Biological and Toxin Weapons Convention were performed in cooperation between NTEs and ToE and were near completion by the end of 2017. The ToE (VERTIC) developed two additional legislative assessment tools during the year: one for International Health Regulations (IHR), in coordination with the WHO, and one for Codex Alimentarius (the Codex) which was coordinated with the FAO. Each partner country provided feedback on the tools. Assessments of legislation according to these new tools will be conducted in 2018. Based upon the analysis, recommendations to harmonize legislation will be formulated, and where possible, amendments to existing law or new legislation will be drafted.

In addition, country specific Common Alert Protocol (CAP) and Civil Military Cooperation (CIMIC) interim reports

NOTABLE PROJECTS OF 2017



were prepared for Afghanistan, Mongolia, Kyrgyzstan, Tajikistan and Uzbekistan. Similar reports are being prepared for the other partner countries, and aggregate regional report will be prepared by summer 2018.

WP2 (Awareness Meetings)

In addition to the four awareness-raising meetings organized in 2016 that involved Afghanistan, Kyrgyzstan, Tajikistan and Uzbekistan, two national awareness meetings were organized in 2017. They were held in Mongolia (26-27 January) and Kazakhstan (30 January). In addition, a regional meeting was held in Bishkek, Kyrgyzstan (2 – 3 February 2017). During 2018, an awareness-raising meeting will be organized for Pakistan on 9-10 April. These meetings provide an opportunity to help local governments better understand the importance of biosafety and biosecurity and emphasize cooperation between local and regional stakeholders.

WP 3 & WP4 (Assessment of Training Infrastructure, Training and Equipment Needs)

A Training Needs Assessment Tool (TAT) was developed by the ToE and sent to partner countries, which forwarded it to relevant organizations. Using input from the partner countries, training infrastructure, as well as training and equipment needs were identified by the end of 2017. The collected information will be used during 2018 for procurement of equipment, materials and supplies in support of the training workshops that will be organized under P53 WP 6.

WP 5 (Train-the-Trainer Workshops)

Six-week-long Train-the-Trainer workshops were provided by the ToE (PHE and RIVM) for each partner country during September and November 2017:

- Afghanistan (in Dushanbe), 23-27 October;
- Tajikistan (in Dushanbe), 16-20 October;
- Kyrgyzstan (in Bishkek), 13-17 November;
- Mongolia (in Bishkek), 20-24 November;

- Kazakhstan (in Almaty), 2-6 October; and
- Uzbekistan (in Almaty), 9-13 October.

From 12 to 14 experts were trained to become biosafety and biosecurity trainers during each workshop. These newly trained trainers will provide sessions under WP 6, in cooperation with ToE experts during 2018.

WP 6 (Training Experts)

Based upon identified needs using the collected information with TAT under WP 3 and WP 4, training plans are being formulated for each partner country as



well as for regional training activities during 2018.

WP 7 (Regional Cooperation and Training Sustainability Efforts)

A P53 regional meeting was organized to support regional cooperation. Held on 2-3 November 2017 in Tashkent, Uzbekistan, the meeting enabled partner countries to present the results of work performed as well as discuss ways to strengthen regional cooperation.

Additionally, work is underway to have the training programs accepted as a formal part of educational programs for students, or requirements for experts as well as to have the programs obtain international recognition.



NEW ISTC PARTNER IN 2017 -APHL



The Association of Public Health Laboratories became an ISTC Partner in June 2017. APHL is a principal contractor for the U.S. Centers for Disease Control and Prevention in Atlanta, Georgia.

The ISTC signed a short-term contract with APHL to deliver two CDC programs: Strengthening the Laboratory Systems Program in Kazakhstan, and Influenza Programmatic Support in Kazakhstan.

Both programs began on July 1, 2017 and were completed by September 30, 2017 at a total cost of \$170,000. Under the Strengthening Laboratory Systems Program, the APHL and ISTC delivered eight three-day quality assurance training programs for up to 100 participants. Participants who passed the exam received certificates. The training programs, which focused on examination procedures and measurement

uncertainty, were held in Karaganda, Almaty, Shymkent, Petropavlovsk, Aktobe, and Oskemen. Two laboratory-based working group meetings were organized in Astana for 70 participants in July and August, 2017.

The ISTC also provided laboratory materials and reagents valued at \$33,000 to support implementation of CDC's Influenza Programmatic Support program in Astana and Almaty.

The CDC, ISTC and Kazakhstan's health ministry organized a roundtable discussion on International Health Regulations (IHR) with other Kazakh ministries. They developed a roadmap and draft IHR document that should be implemented over the next five years.

The ISTC APHL carry-over contract will be signed in March 2018, enabling use of the remaining funds for future projects.

MC 5.01/15B PROJECT SUPPORT TO SOUTHERN AFRICAN STATES IN NUCLEAR SAFETY AND SAFEGUARDS

Project MC 5.01/15B, an EU Partner project implemented by the ISTC, provides support to the Southern African Development Community (SADC) for the improvement of nuclear safety in four countries: Tanzania, Malawi, Zambia, and Namibia. It is centered on the mining, processing and transport of uranium ore and products. The project goals will be achieved through training and sharing best practices utilizing a web-based electronic system to trace the trans-border transportation of uranium ore.

ISTC convened an inaugural meeting of Project participants on 6-8 September 2017 in Pretoria, South Africa, following steering committee meetings in Nairobi on 23 February 2017; in Brussels on 17 May 2017, and in Astana on 13 June 2017. ISTC's partner in implementation of the project was the South African National Nuclear Regulator and Center for Nuclear Safety and Security, as formalized in a MoU. An Agreement to subcontract NNR is being negotiated

and a tender on provision of the web-based communication system is being prepared.

Following a working visit of GB member Eddie Maier to Pretoria, the need for the transfer of knowledge and skills in managing public advocacy campaigns in favor of nuclear security was identified, particularly in several African countries poised to develop pro-nuclear energy strategies. Specific measures are planned for cooperation, involving the Belgium Nuclear Forum on the European side and, on the African side, civil society associations including among others, the African Young Generation in Nuclear, the South African Young Nuclear Professionals Society, the Kenyan Young Generation in Nuclear, and the African Women in Nuclear. The basic target groups for the small-scale project include



NOTABLE PROJECTS OF 2017

members of the media and decision-makers.

On 11 September 2017, ISTC's executive director welcomed a South African delegation to ISTC's offices. The delegation was led by Keitumetsi Mathews, South Africa's Ambassador to Kazakhstan, with Francois Davel, director of International Cooperation and Resources, and Tebogo Makoma of the department of Science and Technology for South Africa and desk officer for Kazakhstan.

Discussions explored further cooperation and potential partnerships with ISTC in areas such as nuclear medicine, capacity building and education.

On November 29-30th 2017 the International integrated workshop on nuclear advocacy and communication was convened by the African Young Generation in Nuclear (AYGN) and supported by the ISTC. More than 100 university students, young researchers and industry professionals from a dozen



technology to nuclear risks and crisis communications, to opportunities and challenges for nuclear in East Africa.

The event, which was part of the Future Energy East Africa Conference, offered ample opportunity for future African leaders to meet senior professionals from international companies including Siemens, RosAtom, McKinsey, Schneider Electric, and others,



African countries gathered in Nairobi, Kenya. Talks and interactive discussions covered a wide range of topics from communicating the benefits of nuclear science and

as well as to talk to government officials, nuclear and energy regulators, and international development partners.



THE SUNKAR REGIONAL RADIOACTIVE EMERGENCY RESPONSE EXERCISE

An important event in ISTC's 2017 activities was SUNKAR, a regional radioactive emergency response table top exercise organized by the European Commission and the ISTC with support from the EU CBRN Center of Excellence for Central Asia, and ENCO, a Vienna-based engineering and management consultancy.

The exercise was a continuation of similar events that took place within the EU CBRN CoE initiative. By attracting participants and observers from several regions, it demonstrated the ISTC's ability to bridge communities of practitioners coming from various parts of the world.

The SUNKAR exercise involved participants and observers from two geographical regions: Central Asia (Uzbekistan, Kyrgyzstan, Afghanistan, and Mongolia) whose representatives directly participated in the exercises, and Eastern and Central Africa (Kenya, Jordan, Burundi, Democratic Republic of Congo, Ethiopia, Ghana, Malawi, Namibia, Rwanda, Tanzania, the Seychelles, Uganda and Zambia), whose representatives observed the exercises and participated in selected exercises planned for the observer programme.

In addition to observers from Central Africa, the exercise was observed by representatives of CoE, HoS, and NFPs, NFPs/officials of other CBRN CoEs in the Middle East, South Eastern and Eastern Europe.

The CBRN CoE Central Asian region's SUNKAR radioactive emergency response exercise took place on June 13-14, 2017 at the Institute of Nuclear Physics in Astana, Kazakhstan. It consisted of a hybrid table top exercise that included simulation on a compressed time scale of a radioactive incident with radioactive source and, going beyond a traditional table top exercise, a practical demonstration of emergency response radiation measurement and identification techniques, as well as on-site emergency

response actions, including the detection and identification of radioactive sources and/or contaminated areas. It also included technical visits to the institute's nuclear facilities.



The exercise was carried out with the active support of the Institute of Nuclear Physics and Gumilyov National Eurasian University. The choice of venue and partners in Kazakhstan is a testament to the nation's rich experience in tackling radioactive and nuclear issues at all levels – legal, technical, research and industrial. Kazakhstan has demonstrated its readiness to transfer expertise and share knowledge with experts from many countries in Central Asia and beyond, employing varying levels of institutional and regulatory preparedness to face radioactive risks.

The technical experts who moderated the exercise



NOTABLE PROJECTS OF 2017

also demonstrated different radiation measurement techniques and assisted participants in the practical use of equipment and in performing measurements aimed at detection and identification of radioactive sources, determination of dose rates, establishing safety perimeters and mapping using radioactive sources to simulate contamination.

The final part of the table top exercise engaged participants in the performance of self-assessment of the proposed emergency response actions, and defined additional measures, tools, procedures, and arrangements aimed at reducing the impact of accidents. SUNKAR's organizers arranged an exhibition of modern radiation measuring and



monitoring equipment. The round table discussion served as a forum for the inter-regional exchange of experience with the various national RN emergency response plans, highlighting the most important aspects while sharing national experience and specifics, discussing lesson learned, issues for further consideration and improvement.

PROJECT 60 SUPPORT TO THE EU CBRN CENTRE OF EXCELLENCE FOR EASTERN AND CENTRAL AFRICA IN NUCLEAR SECURITY

Support the EU CBRN Center of Excellence for Eastern and Central Africa in Nuclear Security (Project 60), implemented by the ISTC in Kazakhstan, managed by the European Commission's DG DEVCO, and funded by the EU's IsSP, involves 12 African countries in a range of activities from training and field exercises to recovery of orphan sources, to recommendations on legal and regulatory frameworks for the management of nuclear material.

The inception meeting of the project's steering committee and joint working group took place in Nairobi on 23 February 2017. ISTC presented a project outline, the composition of the steering committee and the working group, Key Performance Indicators, a work schedule, main activities and expected results from the project. The experts on radioactive and nuclear issues from participating countries agreed that the project's proposed activities could help them to better address the challenges of managing radioactive and nuclear sources in industrial and medical domains, and of ensuring safe trans-border transportation of RN materials. The project work plan and KPIs were accepted. At a meeting of the steering committee in Brussels on 17 May 2017, the Quality Assurance Plan was approved. In Rwanda, the national CBRN team discussed P-60 in April. In May, during a meeting of its national CBRN team, it was announced that Ethiopia would be a participating state in the project.

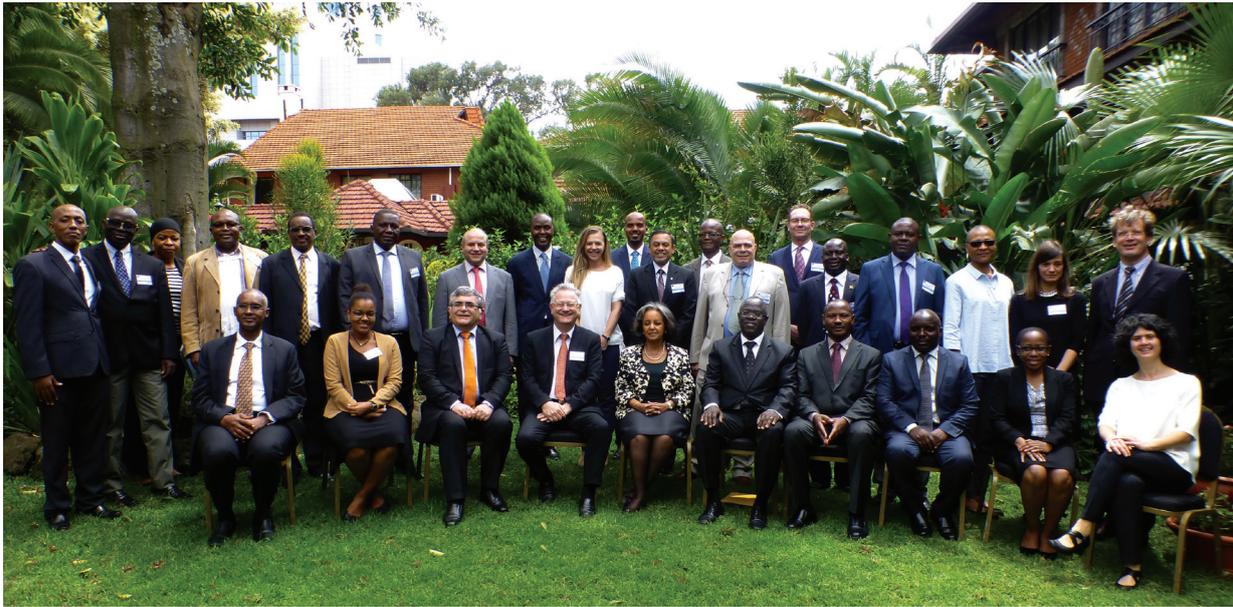
In line with the P-60 Communication and Visibility Plan, ISTC presented the project at the Inaugural African Youth Nuclear Summit in Nairobi on 27-30 March 2017. Project 60 was presented to an international audience

including young and senior nuclear professionals from academia, research and development, radiation services providers, healthcare, nuclear operators, and nuclear regulators. The project was presented to representatives of the International Atomic Energy Agency (IAEA), the World Nuclear Association (WNA), the World Association of Nuclear Operators (WANO), the International Youth Nuclear Congress (IYNC), and participants from national and regional professional organizations from Nigeria, Uganda, South Africa, Kenya, Belgium, Canada, Sweden, the USA, China, and Eastern Africa. The event helped raise public awareness of the activities of the CBRN ECA CoE in general, as well as the P-60 project.

At the third steering committee meeting, held in Astana on 12 June 2017, participating states approved the Communication and Visibility Plan and discussed the initial data-gathering process. Through a distributed questionnaire, relevant specific information



NOTABLE PROJECTS OF 2017



was collected from more than half of the participating countries, with further entries submitted later. Combining the P-60 steering committee meeting with the SUNKAR table top exercise allowed the committee to observe the Regional Radioactive Emergency Response table top exercise held in Astana on 13-14 June 2017. A dedicated website, <http://coe-project60.istc.int>, was launched on 12 June 2017.

Participating states draw on expertise from institutions around the world ready to offer support and assistance. Following a tender to recruit technical expertise, ISTC signed a subcontract agreement on 1 November 2017 with ENCO, a Vienna-based consultancy, along with SCK-CEN, a leading Belgian nuclear training institution, and STUK, Finland's nuclear agency.



REGULAR AND PARTNER PROJECTS IN 2017



REPUBLIC OF ARMENIA

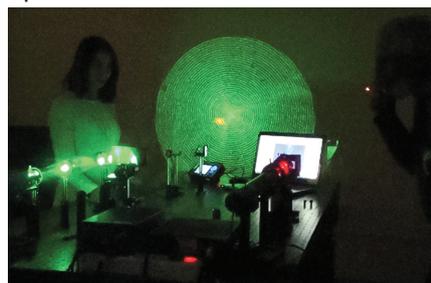
CONTROL OF LIGHT IN STRUCTURED NON-LINEAR MEDIA:
APPLICATION TO ALL-OPTICAL DEVICES

ISTC Project:	A-2130
Project Manager:	Rafael Drampyan
Leading Institute:	Institute for Physical Research of National Academy of Sciences of Armenia
Supporting Institutes:	None
Foreign Collaborators:	Mathieu Chauvet: University of Franche-Comte, FEMTO-ST Institute Cornelia Denz: University of Muenster Kristiaan Neyts: University of Ghent
Project Duration:	1 January 2016 – 31 December 2018
Financial Parties:	EU
Project Cost:	\$357,285

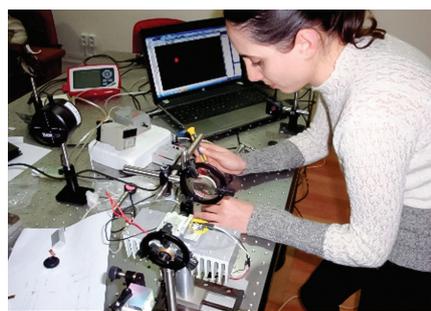
Objectives of the Project:

Development of novel methods and creation of annular symmetry refractive micro-structures in solid and liquid crystals by non-diffracting optical beam technique, providing high contrast and stable light-guiding refractive micro-arrays.

Formation of optical solitons in nonlinear media as waveguides for optical information transfer.



Experiment running



Adjustment of experimental setup

Characterization of novel light-guiding structures by optical methods and numerical simulations.

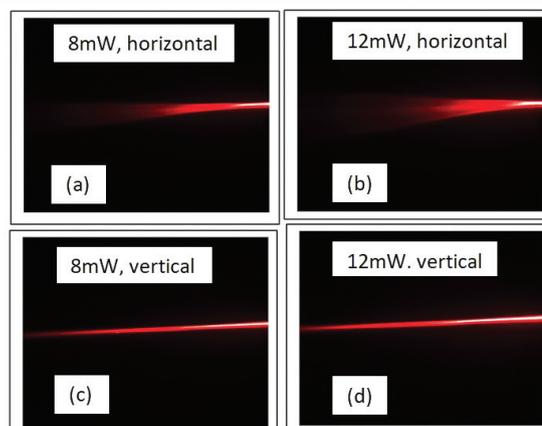
Elaboration of novel optical devices for controlled localization and addressing of optical beam (encoded information carrier) to different micro-array channels (optical interconnects) and other all-optical devices.

Achievements:

The major achievement during the second year of the project's implementation was the soliton formation by 632.8 nm Gaussian beam in azobenzene liquid crystal cell with molecules orientation nearly perpendicular to the input window of the cell (Fig.3). Soliton with large track length up to 8 mm was generated without application of an external electric field. The application of an external electric field allowed control of the propagation length in the soliton regime. The physical model for explanation of soliton

peculiarities is developed which accurately describes all experimental results. Soliton generation without application of external electric field is very promising for different applications.

Propagation of red laser beam (from right to left) at 632.8 nm through azo-LC cell for different polarizations and powers of the laser beam. (a,b) show the divergence of a horizontally polarized laser beam. (c,d) show self-focusing and soliton formation for vertically polarized laser beam. Beam power equals 8 mW (a,c) and 12 mW (b,d). The visible area in each photo is 2 mm horizontal.



DEVELOPMENT OF A METHOD FOR OBTAINING SLOW AND EXTENDED-ACTION FERTILIZER FROM ALUMINO-SILICATE CONTAINING POTASSIUM, CALCIUM, MAGNESIUM AND CAPABLE OF ABSORBING SOLUBLE FERTILIZERS WITH STEEP REDUCTION OF THEIR LOSSES

ISTC Project:	A-2196
Project Manager	Grigoryan Karen Gagiki
Leading Institute:	Institute of General and Inorganic Chemistry, Yerevan, Armenia
Supporting Institutes:	Armenian National Agrarian University, Yerevan, Armenia KazFOAM, Almaty, Kazakstan
Foreign Collaborators:	Agricultural University, Plovdiv, Bulgaria (Manolov I) Agro Eco / Louis Bolk Institute, Christman House, The Netherlands (Elzakker B) Pennsylvania State University / Materials Research Institute, University Park, Pennsylvania, USA (Komarneni S) University of Minnesota, SROC, Lamberton, Minnesota, USA (Pagliari P) Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA (Hammett T)
Project Duration:	1 May 2016 – 30 April 2019
Financial Parties:	EU/U.S.
Project Cost:	\$345,114

Short title: Development of a Method for Obtaining Slow-Action Fertilizer from Alumino-silicate.

Situation: Alumo-silicate rocks containing potassium field spars have an industrial interest to variegate the assortment of potassium fertilizers as a raw material base. However, potassium and other useful elements are in inassimilable form in these rocks. Commercial development of these rocks is linked with the construction of complex processing plants for the rocks, which demand appreciable investment.

Response: The proposed method of treatment, as verified by Dacite Tuff experiments, permits obtaining a fertilizer where potassium, calcium and magnesium

are in plant-assimilable form, and do not require large investments.

A test batch of the product was transferred to the Agrochemical Laboratory of the Armenian National Agrarian University (ANAU) for testing. With the help of the laboratory, vegetative and field experiments, it was established that in the non-irrigated (arid) conditions of the dry steppe and steppe zones of the RA, the impact of the fertilizer (PDT) on growth, yield and crop yield quality is more effective than that of potassium chloride (Fig. 1).

The fertilizer also possesses several extra expressive positive effects: high absorption capacity including NH_4^+ and NO_3^- thus considerably reducing losses, which is important from an



Fig. 1. The impact of PDT on the drought-hardiness of spring barley (vegetation experiment). Performer: Agrochemical Laboratory of the Armenian National Agrarian University, Dr. S. Yeritsyan.

ecological and economical viewpoint; high moisture capacity (500% and more); a significant increase in the availability of soil phosphorus and potassium; and enhanced plant drought-resistance, enabling increased productivity of the cultivation of agricultural crops in non-irrigated and dry conditions.

Upon the decision of ECOGLOBE, PDT can be used in organic agriculture as a complex fertilizer containing K, Ca, Mg, P, Si and other elements.

The nutrients from fertilizers pass into the soil gradually, which is why the fertilizers are of slow and long-lasting effect. They have a noticeable consequence, which



Fig. 2. Results from a barley vegetation experiment: Pots before harvest; Dry whole plants; Fresh whole plants. Performer: Agricultural University, Dept. Of Soil Science and Agrochemistry, Bulgaria, Dr. I. Manolov, Dr. A. Peltekov.

makes it possible to use them again in the same place three to five years later.

Some investigations on PDT have been also carried out in Bulgaria by the project collaborator, Dr. Manolov. In conditions of vegetative experiments, it was established that spring barley still in the phase of full bush formation in comparison with potassium chloride

provided an increase in the height of plants by 4.4 cm (15.3%), the number of leaves was 0.66 pieces (15.8%), the dry weight of leaves made 0.62g (24.4%) (Fig. 2).

PDT efficiency has been investigated also by Kazakhstan Federal Ministry of Organic Agriculture in conditions of vegetative experiments on rice. It has been established that PDT



Fig. 3. Vegetation experiments. General view of the plants. Performer: Kazakh Research Institute of Soil Science and Agro-Chemistry after U. U. Uspanova; Prof. A.S. Saparov, Dr. G.A. Saparov, Dr. A. Otarov



GEORGIA

DISTRIBUTION AND DIVERSITY OF BARTONELLA PATHOGENS AMONG PEOPLE AND ANIMALS IN GEORGIA AND EVALUATION OF FACTORS ASSOCIATED WITH THE EMERGENCE OF BARTONELLOSIS

ISTC Project:	G-1683-p
Project Manager:	Lile Malania
Leading Institute:	National Center for Disease Control and Public Health, Tbilisi, Georgia
Supporting Institutes:	None
Foreign Collaborators:	Centers for Disease Control and Prevention (CDC) / National Center for Infectious Diseases / Division of Vector-Born Infectious Diseases, Fort Collins, Colorado, USA (Kosoy M)
Project Duration:	1 December 2013 - 9 October 2017
Financial Parties:	US Department of Health & Human Services / US Centers for Disease Control and Prevention (CDC), Atlanta, GA, USA
Project Cost:	164, 300 \$ (Partner)

The main objectives of the project

- To study the diversity and prevalence of *Bartonella* strains in populations of small mammals in different regions of Georgia;
- To carry out comparisons of the molecular genetic characteristics of the "Georgian strains" with those isolated in the USA;
- To estimate the degree of genetic relation of *Bartonella* isolates found in humans with those isolated from small mammals, and to evaluate the pathogenicity of the latter for humans;
- To develop methods for direct detection of *Bartonella* strains in natural reservoirs and clinical samples; and

- To develop methods for molecular epidemiological studies of bartonellosis.

The expected results:

The results obtained from this collaborative research project on the characterization and comparison of *Bartonella* strains of animal and human origins from Georgia and the USA will be very useful for: Determining whether species of *Bartonella* recently identified in Georgia might be a cause of otherwise unexplained human illness; Describing the distribution and regional diversity of animal reservoirs of *Bartonella* infections in the region; Checking whether identified *Bartonella* pathogens can

be transmitted by arthropod vectors (fleas, ticks, and mites); Proposing diagnostic means for identification of *Bartonella* infections in clinical samples; Preparing databases for molecular epidemiology of *Bartonella* infections; and Determining factors associated with the emergence of bartonellosis in Georgia.

Phylogenetic relationships of the 28 B. bovis isolates inferred from 5085bp - 5119bp concatenated sequences of ftsZ, gltA, groEL, nuoG, ribC, rpoB, ssrA, and ITS fragments.

Important Scientific Discoveries

PCR-based assays for *Bartonella* detection was established for the first time in Georgia. This assay was

REGULAR AND PARTNER PROJECTS IN 2017



qPCR (A) and Conventional PCR on gel-electrophoresis (B)

used for a preliminary screening of samples.

For the first time, we built a capacity of serological diagnostic for clinical and animal samples to perform IFA for *Bartonella* diagnostics using antigens prepared from reference and locally obtained strains.

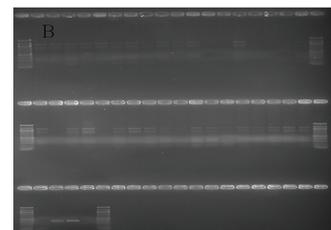
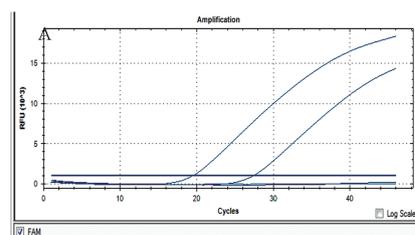
Due to this project, data on the distribution of Bartonella bacteria in populations of animals and humans were collected for the first time in Georgia. Analyses of *Bartonella* species diversity have been performed including a comparison between Bartonella strains isolated in Georgia and the USA.

For the first time in Georgia, flea DNA analysis showed the

presence of *B. taylorii*. This is first evidence of this species detected in Georgia.

Three positive clinical samples belonging to HIV patients were positive on *Bartonella* spp. This is first evidence of HIV/Bartonella co-infection. This discovery and collaboration with the HIV hospital underlines the importance of this study and the importance of laboratory diagnostics. Under the same discovery, for the first time in the world, *B. taylorii* has been described as a human pathogen.

Analysis of DNA extracted from lymph nodes from a patient with lymphadenopathy and fever was found positive for a *Bartonella* sp. and demonstrated similarities between this strain and both *B. tribocorum* and *B. elizabethae*. Further characterization has demonstrated that this strain was identical to the strain prevalent in rats in Tel Aviv, Israel. Originally this human case was suspected as cat scratch disease. Importantly, this case was likely caused by a *Bartonella* sp., which previously was not known as a human pathogen. Further investigations



are required to estimate the risk of exposure to this novel pathogen among the urban populations of Georgia.

Twelve isolates obtained from *M. libycus* were different from all previously described Bartonella spp., and presumably represent two novel bacterial species. Analysis of the 12 isolates by using three genetic markers has proven the novelty of the strains, the names of *Candidatus Bartonella tbilisii* and *Candidatus Bartonella katsitadzensis* were proposed for these species.

COMPARATIVE ANALYSIS OF FEASIBILITY AND COST-EFFECTIVENESS OF HIV TESTING IN GEORGIA'S HEALTH CARE FACILITIES

ISTC Project:	G-2211
Project Manager:	Ketevan Shermadini
Leading Institute:	Infectious Diseases, AIDS and Clinical Immunology Research Center. Tbilisi, Georgia
Supporting Institutes:	Gudushauri National Medical Center (GNMC). Tbilisi. Georgia
Foreign Collaborators:	Johns Hopkins Bloomberg School of Public Health. Baltimore, Maryland, U.S. (Nelson K.)
Financial Parties:	National Institutes of Health / National Institute of Allergy and Infectious Diseases (NIH/NIAID), Tbilisi, Georgia
Project Duration:	February 1, 2016 - July 31, 2017
Total Project Cost:	U.S. \$65,099

Objectives / Scope of Work and Technical Approach

Georgia is a small country with HIV prevalence of less than 0.5%. There is universal access to HIV

treatment and care; however, 50% of all HIV-infected persons are not diagnosed until late in their infection. Late HIV diagnosis is a significant problem in Georgia, with 55% of newly

diagnosed HIV patients presenting with a CD4 count <350 cells/mm³.

To evaluate the knowledge, attitude, and practice of health care providers, and identify barriers to

REGULAR AND PARTNER PROJECTS IN 2017



Training and meetings with physicians and lab physicians at Gudushauri National Medical Center

HIV testing, we surveyed health care providers, conducting in-depth interviews and focus group discussions among key stakeholders to develop recommendations for improving the current strategies for HIV testing in health care facilities in Georgia.

Our project also evaluated the feasibility and effectiveness of routine HIV testing of all persons admitted to Gudushauri National Medical Center, a tertiary referral hospital in Tbilisi. An internationally recognized 0.1% standard of effectiveness was considered the threshold.

Anonymous interviews were conducted of 401 randomly sampled physicians. They were asked multiple questions concerning their knowledge, attitudes, and practices concerning HIV and their perceived barriers to HIV screening. Additionally, 40 confidential in-

depth interviews and three focus group discussions were conducted among key stakeholders. Data were analyzed by R software. Chi Square analysis was used to compare groups of different specialties. In-depth interviews were analyzed using the content analysis technique, with a deductive approach. A matrix was developed to summarize data retrieved from transcripts.

A prospective study was conducted in one of Georgia's largest multi-profile hospitals, the Gudushauri National medical Center (GNMC). Training on HIV testing issues was provided to 80 physicians and lab physicians. Opt-out testing was conducted by trained health care providers using the HIV Ag/Ab rapid test as part of the standard of care among all adult patients 18 - 65 years of age admitted to GNMC. Patients with known HIV-positive status were excluded. Patients who declined the HIV test were involved in anonymous double-blind HIV Ag/Ab testing without any link and identification information. Specimens, reactive on rapid test were confirmed by Western Blot or nucleic acid test. Data were analyzed by R software.

Results

KAP interviews . A total of 401 interviews were conducted. The mean age of physician respondents was 43; 71% (284) were women with 19 years' mean work experience; 40% (161) reported having received training on HIV; 87.3% (350) were aware of the national free HIV testing program; and 78.3% (314) of providers reported that HIV testing is performed in their clinical setting. The clinical symptoms of HIV/AIDS were

correctly Identified by 36.2% (145) of respondents; and 14.2% (57) did not know the means of HIV transmission. The disclosure of a patient's HIV status to ensure physician safety was considered mandatory by 79.6% (319) of respondents.

Barriers to HIV testing were identified as stigma by 33.9% (136), while 52.9% (212) saw the lack of information, and 58.9% (236) felt that financial resources and governmental and administrative support were barriers.

There was a significant difference ($P < 0.05$) between respondents' groups regarding receiving training on HIV, awareness of free HIV testing, identification of HIV risk behaviors and between groups who consider that there are no barriers.

In-depth interviews. Awareness: low awareness of existing regulations, guidelines, and lack of knowledge on HIV testing, counseling, treatment, and prophylactic strategies among health care providers.

Policy: low political interest in expanding HIV testing and implementing routine testing in all facilities.

System: lack of administrative and financial support for implementation of HIV testing, except surgical departments;

Most respondents consider opt-out HIV testing as more feasible and acceptable compared to targeted testing.

HIV testing. Of the 3,002 patients screened for HIV at GNMC, 18 (0.6%) were confirmed to be HIV-positive, ten (0.41%) were HIV-diagnosed among patients



Teamwork at Gudushauri National Medical Center

REGULAR AND PARTNER PROJECTS IN 2017

who agreed to be HIV tested, and eight (1.34%) of the 596 (19.8%) patients who refused HIV testing. All identified patients were successfully linked with care.

Conclusions

The main barriers to HIV testing in health care facilities include: a low level of knowledge about HIV testing, lack of treatment and prophylactic strategies among health care professionals; poor motivation; HIV-related stigma among health care workers; lack of HIV training programs, and insufficient financial or administrative support.

The pilot routine testing showed to be effective and feasible at one multi-profile hospital (GNMC). Significant was the prevalence of HIV in a double-blind group, which can be explained by their previously known HIV-positive status.

Based on these findings, we suggest the need to improve HIV testing performance in health care facilities to increase early diagnosis and effective treatment of HIV patients. Moreover, education of health care providers concerning the importance of screening for early diagnosis and treatment to preserve the health of HIV patients and prevent transmission is critically needed.

We suggest that routine HIV testing be implemented in health care facilities, especially in emergency settings across the country. More



Project team. Infectious Diseases, AIDS, and Clinical Immunology Research Center

efforts should be taken to convey patients on HIV testing so that HIV-positive persons are not missed and so that patients may be diagnosed early and treatment of patients with HIV be improved.

Two articles were developed to generate publicity for the project:

Barriers to HIV Testing in Health Care Facilities: Knowledge, Attitude and Practices of Health Care Providers in Georgia. Ketevan Shermadini, Nino Badridze, Otar Chokoshvili, Akaki Abutidze, Maya Tsintsadze, Tengiz Tsertsvadze, and Kenrad Nelson.

This abstract No. MOPEC0665 was presented as the poster presentation at the 9th International AIDS Society (IAS) Conference on HIV Science on July 23-26, 2017 in Paris, France.

Feasibility and Effectiveness of Routine HIV Screening in Emergency Settings in Georgia. Ketevan Shermadini, Nino Badridze, Otar Chokoshvili, Akaki



Laboratory work at the Infectious Diseases, AIDS, and Clinical Immunology Research Center



Project team. Infectious Diseases, AIDS, and Clinical Immunology Research Center

Poster presentation of the project results at 9th IAS Conference, July 24, 2017, Paris, France

Abutidze, Maya Tsintsadze, Giorgi Khechiashvili, Marina Ezugbaia, Natia Chokoshvili, Marine Gelantia, Nikoloz Chkhartishvili, and Kenrad Nelson.

This abstract No. PE23/40 was presented as the poster presentation at the 16th European AIDS Conference (EACS) on October 25-27, 2017 in Milan, Italy.



Kazakhstan

DEVELOPMENT OF A METHOD FOR OBTAINING AND USING TUBERCULOUS BACTERIOPHAGE

ISTC Project:	K-2086
Project Manager:	Nazym Syrym
Leading Institute:	Research Institute for Biological Safety Problems (RIBSP) CS ME&S, Kazakhstan
Supporting Institutes:	None
Foreign Collaborators:	Uladzimir Antonenka: Institute of Microbiology and Laboratory Medicine Yasuhiko Suzuki: Hokkaido University Research Center for Zoonosis Control
Project Duration:	1 July 2014 – 30 June 2017
Financial Parties:	EU and Japan
Project Cost:	\$466,300 (EU - \$233,150 and Japan - \$233,150)

Objective and Expected Results:

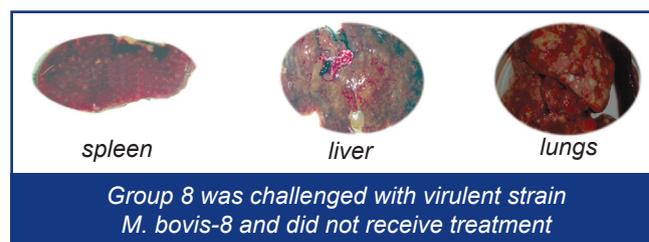
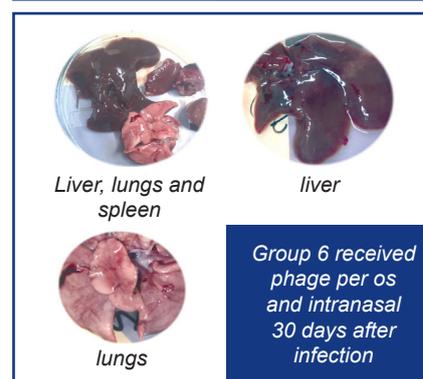
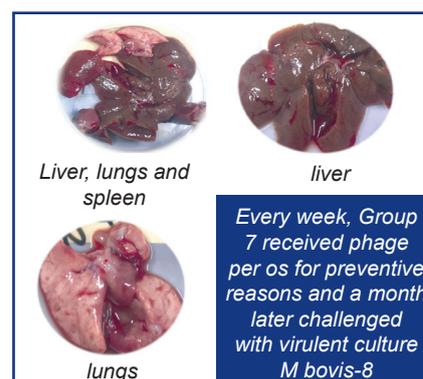
Obtaining mycobacterium phage and its use in the development of methods for increasing the effectiveness of tuberculosis preparations and obtaining of mycobacterium phage and its use in the development of methods for increasing the effectiveness of anti-TB (Tuberculosis) preparations.

Achievements:

The project's goal was met, and all tasks have been completed successfully. The main project accomplishments include:

- Worked out scheme of primary processing of test samples, the application of which allowed isolating MB phages;
- Development of a method for isolation and titration of MB (micobacterium) phages, which showed the best results;

- Development of methods for isolation of MB phage from biological material (pathological material, blood). The nucleotide sequence of PCR product of cluster D MB phage with a size of 250 bp was deciphered. Based on the results of preliminary experiments, an optimal virulent mycobacteriophage specific for *M. bovis-8* was selected. Selected optimal temperature regimes were chosen. It had been determined the optimal ratio of MB phage and *M. bovis-8* culture to be used for bio preparation, which allows a maximum titer of the phage in the phagolysate;
- Establishment of the degree of anti-tuberculosis activity of MB phage. The findings suggest that this variant of MB phage has higher therapeutic activity than other groups.



EXTREMOPHILES FROM KAZAKHSTAN'S UNIQUE ECOSYSTEMS AS POTENTIAL PRODUCERS OF NOVEL ANTIBACTERIAL AND ANTICANCER AGENTS

ISTC Project:	K-2239
Project Manager:	Trenozhnikova Lyudmila Petrovna
Leading Institute:	Institute of Microbiology and Virology, Almaty, Kazakstan
Supporting Institutes:	N/A
Foreign Collaborators:	National Cancer Institute, Frederick, Maryland, USA (Beutler J)
Project Duration:	1 April 2017 – 1 April 2018
1	US Department of Health & Human Services / National Institutes of Health / National Cancer Institute, Bethesda, Maryland, USA
Project Cost:	\$25,000

The aim of the Project: To obtain antibiotic preparations from extremophilic actinomycetes isolated from the unusual ecosystems of Kazakhstan under neutral and alternative growth

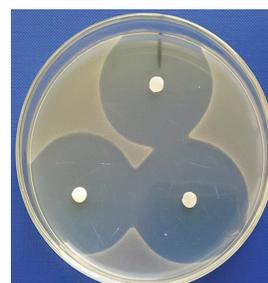
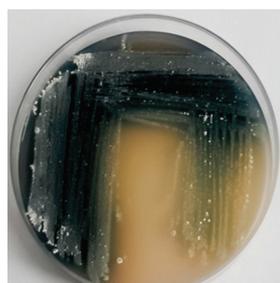
conditions, and to study the antibacterial action of the products against the ESKAPE (*Enterococcus*, *Staphylococcus*, *Klebsiella*, *Acinetobacter*, *Pseudomonas*, *Enterobacter*) bacterial pathogens

and their antitumor properties.

Achievements: Because of the project, preparations for new antibiotics (196 samples) formed by extremophilic actinomycetes were obtained from Kazakhstan's unusual

REGULAR AND PARTNER PROJECTS IN 2017

ecosystems (takyr-type saline soils, salined takyrs, solonchaks, and silt from saline lakes) under alternative growth conditions (high pH and salinity). The anti-cancer properties of the preparations are being studied by Dr. Beutler at the National Cancer Institute (USA) and their antimicrobial properties against the causative agents of the ESKAPE group investigated Dr. Azizan at the Medical School of Nazarbayev University (Kazakhstan). For the first time, Kazakhstan's unusual ecosystems were used to screen new anti-



cancer, antibacterial and antifungal antibiotics. The project provides for the development of new approaches to screening pharmaceutically valuable natural substances, and

represents a significant contribution to the search and research into new natural antibiotics. The project's results will be presented at the NCI Global Cancer Meeting (USA, 2018).



Kyrgyzstan

MOLECULAR-GENETIC MONITORING AND PASSPORTIZATION OF TRANSBOUNDARY SARI-DZHAS FOCUS OF PLAGUE WITH GIS-TECHNOLOGIES IN KYRGYZSTAN AND KAZAKHSTAN

ISTC Project:	KR-2111
Project Manager:	Sariyeva Gulmira, Ph.D (Biology)
Leading Institute:	Issyk-Kul State University, Karakol, Kyrgyzstan
Supporting Institutes:	Karakol Anti-Plague Department, Karakol Kyrgyzstan
Foreign Collaborators:	Dr. Michael Kosoy, Centers for Disease Control and Prevention, Division of Vector-Borne Diseases, Fort Collins, Colorado, USA. Prof. Vladimir Motin, University of Texas, Medical Branch, Department of Microbiology and Immunology. Dr. Serge Morand, Institute of Evolutionary Sciences of the University of Montpellier, CIRAD, France.
Project Duration:	2014 - 2017
Financial Parties:	EU, USA
Project Cost:	€152,659 / \$207,800

In 2017, a field anti-plague expedition was organized to the Kok-Dzhar-Turuk site of the Sari-Dzhas natural plague focus.

The 700 km² area of high-mountain syrts (summer pastures) was difficult to reach. There, the main carrier of plague – the grey marmot - was observed for the presence of the plague pathogen (Fig. 1, a-b). Over 30 days, 487 marmots (*Marmota baibacina*) and 339 small mouse-like rodents were

trapped and 1,035 ectoparasites (fleas, ticks, lice) were collected from them. No plague pathogene was found.

Fourteen strains of *Yersinia pestis* isolated during different years from plots of the Sari-Dzhas natural plague focus were collected from the Museum of Living Strains of the Center of Quarantine and Dangerous Infections in Bishkek. The Kyrgyz strains were genotyped by the method of multi-locus

variative analysis (Multiple Loci VNTR Analysis, MLVA) and their phylogenetical analysis was done using the PAUP 4.0 program (<http://paup.csit.fsu.edu/index.html>).

The results were:

The plague epizootics in the Sari-Dzhas natural plague focus among wild animals are fixed again starting from 2012 until 2016, after 39 years of silence (Fig.2);

The main climatic parameters on the area of the Sari-Dzhas natural

plague focus have increased in recent years: The duration of the summer period with an average daily temperature above +5°C is 50 to 60 days, and relative humidity is 1.5% to 3.6% with double the precipitation;

In 2014-2017, the reproduction score and ecological-physiological state of the marmot population is satisfactory; the number of marmots in coming years should increase. However, in general, the marmot population in the analyzed period is still lower than in 1977 (Fig. 1, c). We assume that if the negative impact of human activity on the area of the Sari-Dzhas natural plague focus, through hunting, tourism, and cattle ranching is minimized, the population density of marmots should increase;

In the Sari-Dzhas focus, highly virulent strains of the plague *Yersinia pestis* ssp. *pestis*, biovar *Antiqua* are circulating. Some strains form separate branches of the biovar *Antiqua*. Circulation of the pathogen on the epizootic territory occurs continuously, but with varying degrees of intensity, depending on the current state of the plague parasitic system and abiotic and anthropogenic factors.

The results of the plague survey from the archives of 1942 through 2017 were collected in the electronic Epidemiology and Epizootology of

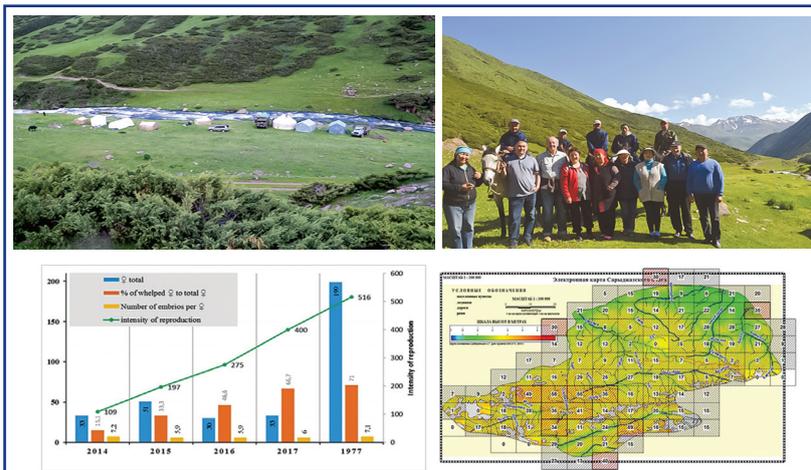


Fig.1. A - the camp of the anti-plague expedition in 2017 in the Zhylanach valley; B - the staff of the expedition, with international collaborator Dr. Serge Morand, France; C - the dynamic of marmots reproduction in the Sari-Dzhas natural plague focus in 2014-2017 compared to 1977; D - local distribution of the index of epidemiological vulnerability (%) of the area of Sari-Dzhas natural plague focus.

Plague in the Sari-Dzhas Natural Plague Focus of Kyrgyzstan database, which was registered by Kyrgyzpatent in 2017 (Registration #33 from 19.04.2017).

As a result of this work, the final maps of the Index of Epidemiological Vulnerability and Risk of the Sary-Dzhaz Autonomous Plague Focus were produced (Fig.1, d). The Index of population vulnerability varies from 0% to 69%. In this case, the sectors without any detection of *Y.pestis*, no resident population that uses the land for grazing, tourism and hunting, received 0%. Maximum value of the Index of epidemiological vulnerability (69%) relates to sector 3124406342 (resident population in this sector is absent, but 46% of the land is used for grazing, 100% of the land is used for tourism and hunting, and during the field work on 24-27 June 2012, *Y.pestis* was detected in animals.

The Atlas "Spatial and Temporal Characteristics

of the Saridzhas Natural Plague Focus in Kyrgyzstan is designed based on the Karakol Anti-Plague Department archive data from 1942 through 2017. It contains 156 pages of text with 72 figures, maps of isolated strains of plague per year of field observation, 25 tables, an annex as an original report of the anti-plague expedition of 1946, and a conclusion with the main results of the project. This atlas is of interest to epidemiologists, bacteriologists, anti-plague, and quarantine service researchers in Kyrgyzstan and around Central Asia.

Six research papers were published in Kazakhstan, Russia, and Kyrgyzstan; one more paper is in the peer review process for the Journal of Vector-Born and Zoonotic Diseases. Eight abstracts were presented at the 22nd Current Issues of Zoonotic Diseases international scientific conference held in Mongolia in 2017, the 12th International Symposium on *Yersinia*, Georgia, 2016, and the International Conference on Zoology and Medical Parasitology, in Chicago, USA.

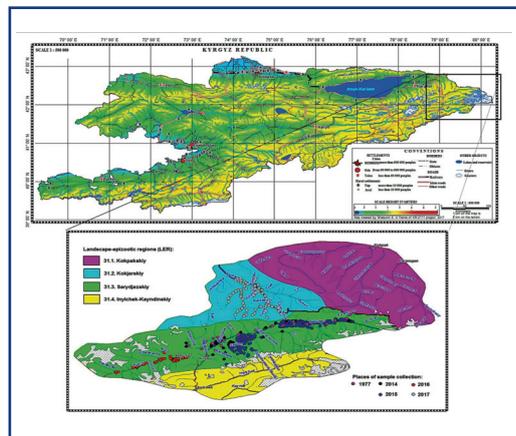


Fig.2. The map of the Sari-Dzhas natural plague focus with local sites where project expeditions were working in 2014-2017



Tajikistan

“MOLECULAR CHARACTERIZATION OF FIELD ISOLATES AND IMPROVING SURVEILLANCE FOR RABIES IN TAJIKISTAN”

ISTC Project:	#T-2198
Project Manager:	Karomatullo Khamroev
Leading Institute:	National Center of Veterinary Diagnostics, Dushanbe, Tajikistan
Supporting Institutes:	State Sanitary Epidemiological Surveillance Service State Scientific and Research Institute of the Forestry Agency of the Government of the Republic of Tajikistan Institute of Problems of Biological Safety
Foreign Collaborators:	Dr Ashley Banyard, Animal and Plant Health Agency (APHA), Dr. Anthony R Fooks, Animal and Plant Health Agency (APHA)
Project Duration:	2016 - 2019
Financial Parties:	Ministry of Defense, London, UK
Project Cost:	\$450,000

Introduction

Rabies is a widely spread infectious disease of warm blooded animals and humans, which causes central nervous system dysfunction, paralysis, encephalomyelitis and death. It has been registered in the territories of 80 countries of the world including Tajikistan and in the last years the registered cases of rabies have constantly increased. There is a need for a precise and timely diagnosis of the disease, especially in cases in animals when there is a risk of its transmission to humans, as rabies is a lethal infection and its control has a major social importance.

The objectives of this project are to undertake (i) comparative research studies on rabies which include systematic collection of pathological samples, (ii) capacity building of local specialists, (iii) an awareness campaign based on the results of a knowledge, awareness and practices (KAP) survey, and (iv) phylogenetic studies of rabies viruses detected in Tajikistan.

The leading institute for implementation of the project is the National Center for Veterinary Diagnostics

and partners are the State Sanitary Epidemiological Surveillance Service, State Scientific and Research Institute of the Forestry Agency of the Government of the Republic of Tajikistan and Institute of Problems of Biological Safety.

Completed activities during the reporting period:

The project has 5 tasks and 20 subtasks. During 8 quarters of project implementation considerable work was conducted.

Samples have been collected from all regions and some of them were transferred onto FTA cards and supplied to collaborators to allow strain identification.

Table 1. Summary of samples collected from different animals species in Tajikistan during different project quarters. The number of cases submitted is shown with the number testing positive in brackets.

During the reporting period 5 missions of partners and 5 missions of collaborators have been conducted. The key tasks of the project are the followings: preparation of personnel through the provision of training locally and in UK, supply of equipment and materials for implementation of the project, introduction



REGULAR AND PARTNER PROJECTS IN 2017

Table 1.

Quarter	Bat	Calve (<3 months)	cattle (>3 months)	ow ned dog	stray dog	owned cat	stray cat	donkey	fox	goat	jackal	owl	rabbit	sheep	Hedgehog	Mouse	Rat	Head of wolf	Grand Total	% positive
1			15 (11)	55 (26)	5 (4)	3 (1)		1 (1)	1										80 (43)	54
2			10 (8)	17 (11)	1	1 (1)		1 (1)											30 (21)	70
3		1	9 (3)	26(9)	5 (4)	2 (1)								2			2 (1)		47 (17)	36
4			8 (3)	22 (9)	4 (3)	2				1 (1)			1				1 (1)		39 (18)	46
5			8 (5)	19 (12)	4 (3)						1 (1)	1				1			34 (21)	62
6	5		3	21 (12)	6 (4)	2		1 (1)	1						1		1		41 (17)	41
7	1		5 (4)	18 (9)		2	1(1)	1 (1)	1 (1)								2		31 (16)	52
8	8		5 (4)	16 (14)	2 (2)	1	1 (1)							1		1	1	2	38 (23)	61
Grand Total	14	1	63 (38)	194 (102)	27 (20)	13 (3)	2 (2)	4 (4)	2	2 (2)	1 (1)	1	1	3	2	1	7 (2)	2	340 (176)	52



of PCR methods for diagnosing rabies, conduction of Knowledge, Attitude and Practices (KAP) survey, collection of samples from regions of the country and provision of practical and technical assistance to local specialists.

The trained specialists will contribute to the project in collection and testing of samples in regions of the country.

Two specialists from NCVD and 2 specialists from IPBS were trained from the 6th to the 16th June 2017 at the APHA laboratory in UK on virus sequence generation and phylogenetic analysis.

The UK and Tajik scientists were sampling bats in an Isfara Awareness campaign on prevention of rabies.

This project was funded by the UK's International Biological Security Programme. Report prepared by Karomatullo Khamroev. Project Manager, T- 2198 project. 14.02.2018



LIST OF COMPLETED PROJECTS

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Project No#	Short title	Lead Institute	Funding party	Collaborator Country
#A-2089	Effective method for monitoring environmental state in a post-radiation period	Yerevan State University	EU, JP, USA	UK, USA, Japan
#A-2123	W-Cu Composite Nanomaterials	Institute of Chemical Physics	EU	Spain, USA
#A-2133	Thermoregulating Coatings for Space Vehicles	Institute of General and Inorganic Chemistry	Partner	
#G-1683	Bartonella Pathogens in Georgia	National Center for Diseases Control	Partner	USA
#G-1966	Acoustic Detection of Electron Spin Resonance	Tbilisi State University	Partner	Germany, USA
#G-2101	Pathogens in Georgian bats	National Center for Diseases Control	Partner	USA
#G-2201	Barriers and facilitators to screening and treatment for HCV	Curatio International Foundation	Partner	USA
#G-2215	Evaluation of M/XDR TB patients who were lost-to-follow-up	National Center for Diseases Control	Partner	USA
#K-1282	Preparation with Tonic, Antioxidant and Anti-tumor Activity	National Center of Biotechnology	Partner	USA
#KR-2091	Thorium Transport With Natural Water	Institute of Physics	EU, USA	USA
#T-1586	Typhoid Diseases in Tajikistan	Republican Center for State Sanitary Epidemiological Control	Partner	Thailand
#T-2023	Viral hepatitis E in Tajikistan	Institute of Gastroenterology, Academy of Sciences, Republic of Tajikistan	Partner	USA
#T-2067	High-temperature thermoelectric materials	Institute of Chemistry named after V.I.Nikitin, Academy of Sciences, Republic of Tajikistan	USA	USA
#T-2076	Dust storm and waste tailings isotope migration in Tajikistan	Physical-Technical Institute	USA	France, USA

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