ISTC 2021

ANNUAL REPORT

ISTC
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CONTENT

The International Science and Technology Center (ISTC) is an intergovernmental organization connecting scientists with their peers and research organizations. ISTC facilitates international science projects and assists the global scientific and business community to source and engage with institutes that develop or possess an excellence of scientifc know-how.

Open and Transparent International Cooperation

10 *Signatories to the international agreement have full representation on the Governing Board.*

Projects and activities are submitted for review and concurrence by the Parties. **100%**

4 *Types of audits and reviews, including annual financial audits, internal project audits, Party project audits, and Party strategic reviews and audits of the ISTC.*

Projects in the ISTC database - Parties have access to project information and receive regular updates. **390**

Strong Governance

All Parties to the ISTC have equal representation on the Governing Board. The Board establishes the policies and procedures of the ISTC, provides guidance and direction to the Secretariat, and approves the operating budget.

Regular Oversight

The ISTC is extensively reviewed and audited. The Board commissions an annual financial audit, and several Parties have conducted audits and reviews of the ISTC. The ISTC also conducts regular project audits, and Parties and Partners regularly conduct outside audits and reviews of their respective projects.

Open Communication

In addition to two Governing Board meetings and two coordination meetings annually, the Secretariat regularly provides projects and activity updates to the Parties. The Parties also have access to ISTC's project database.

STATEMENT OF THE CHAIRMAN OF THE GOVERNING BOARD

Thirty years ago, the idea for an International Science and Technology Center (ISTC) emerged at a time of rapid technological, social, political, and economic change. The goal of the ISTC Parties was then, and is now, to ensure that promising technologies that might also present risks could be developed safely for peaceful purposes. Subsequent achievements through ISTC cooperation have enhanced the health, prosperity, freedom, and security of the citizens of all the Parties. This past success was made possible because the Parties and other participants chose open and transparent international cooperation to advance and share responsible science. Confidence and trust grew because all ISTC activities are subject to consensus-driven, intergovernmental decision making and shared oversight.

Originally proposed by the Russian Federation, Germany, and the United States, the ISTC has expanded to include current members Armenia, Georgia, Japan, Kazakhstan, Kyrgyzstan, the Republic of Korea, Norway, Tajikistan, the United States, and all the members of the European Union. More nations are considering membership. Kenya has begun the membership process, and over 60 additional countries have worked with the ISTC through mechanisms other than full membership.

Today, we live in a world perhaps more challenging and threatening than when the ISTC was founded. Violence across borders exists in many parts of the world, and international armed conflict has returned to Europe. Confrontation and conflict may be made worse by climate change and disease. That so many different governments chose to participate in open, unclassified scientific and public health cooperation proved valuable both to ISTC Parties and other nations during the COVID-19 pandemic. The ISTC has also proved to be an excellent means to share knowledge and lessons learned when erroneous information abounds.

After the 2015 withdrawal of Belarus and the Russian Federation from the ISTC, the movement of the ISTC Headquarters from Moscow to its current location in Nur-Sultan in Kazakhstan necessitated the negotiation of a new agreement. That agreement to continue the ISTC was ratified by each of the remaining Parties in accordance with their own constitutional requirements and then entered into force in December 2017 when the Republic of Korea completed its ratification. The new agreement provided a solid legal framework for cooperation in responsible science. The agreement codified the ISTC's existing diplomatic status and continued certain tax exemptions. Under the new agreement, the ISTC was able to become more efficient even as it expanded geographical reach and substantive areas of cooperation.

Those governments that have remained in the ISTC and those governments that have expanded cooperation are fortunate that the ISTC already exists. Given the current world crisis, timely recreation of this valuable institution would have been very difficult. The ISTC's response to the pandemic is an example of why this cooperative science center remains so important. Working together on medical science, disease surveillance, and public health during the COVID-19 pandemic was more effective because the habit of cooperation in these fields had already been well exercised. Likewise, sharing facts and knowledge is the most effective way to reduce the harm done by misinformation and the intentional spread of disinformation.

Recently, large scale disinformation campaigns that falsely accused Georgia and Ukraine of having illegal biological warfare programs have added similar allegations against the ISTC's sister organization headquartered in Kyiv, the Science and Technology Center in Ukraine (STCU). These propaganda campaigns have now metastasized to include the same false accusations against the ISTC.

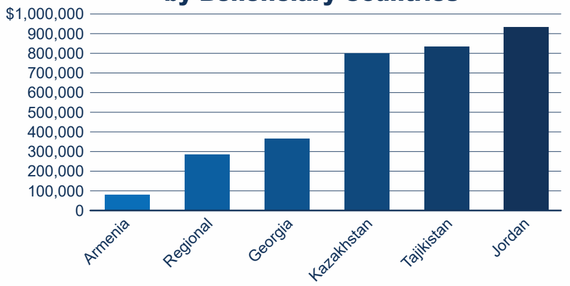
Sadly, this disinformation originates primarily in the Russian Federation. The Russian government knows well that these accusations are false. For almost a quarter of a century, the headquarters of the ISTC was in the Russian Federation. About $1.5 billion was invested in Russian science cooperation through the ISTC, and much of that was in biological research and public health. High level Russian officials worked closely with the ISTC and served on the ISTC Governing Board. Russian ministries and scientists participated in the selection of the projects, the conduct of research, and the evaluation of performance. Russian citizens served on the ISTC staff and helped archive records. None of it was secret. Information on the programs is publicly available, most of it online – for everyone, whether they are an ISTC member or not. In addition, networking with other organizations such as the European Union (EU) Chemical, Biological, Radiological and Nuclear (CBRN) Risk Mitigation Centres of Excellence (CoE) (together, EU CBRN CoE) provides additional public perspectives on the activities of the ISTC.

The Parties working together can be proud of their contributions through the ISTC to the well-being of their own citizens and indeed those of many other countries. All ISTC Parties are equal members of the Governing Board, but no Party deserves more gratitude than the Government of Kazakhstan, which proudly hosts the ISTC headquarters. The ISTC staff, whether Kazakh nationals or from other countries, found a way to continue to be effective throughout the pandemic. This service also deserves special recognition. Despite the world turmoil from disease and war, we can be confident that the ISTC has shown the value of transparent international science cooperation.

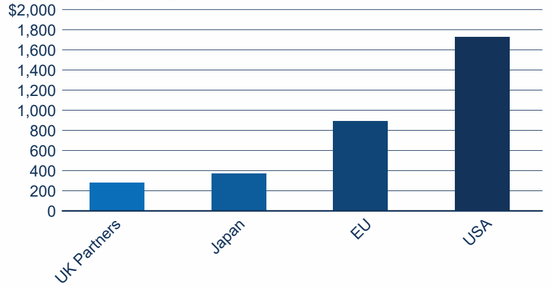
Ronald F. Lehman, Ph.D
Chair, Governing Board, ISTC

OVERVIEW OF ISTC ACTIVITIES

Projects Funded in 2021 by Beneficiary Countries



Projects Funded in 2021 by Party and Partners (in thousands)



STATEMENT OF THE EXECUTIVE DIRECTOR

This year continued in the same vein in regard to the COVID-19 pandemic and in the same operational mode of virtual meetings continuing as the new norm. As mentioned in last year's report, ISTC operations were largely unaffected. After working remotely when the office was closed, all staff returned to the office in September 2021, improving morale after remote working and Zoom fatigue.

Several notable events took place in 2021.

- After several years of outreach, Kenya decided to join ISTC and the membership process is underway. Progress is being made in discussions on membership for Uzbekistan. Uzbekistan is a natural fit for our Central Asian activities and is involved in numerous ISTC projects. Discussions with other interested countries continue.
- The Science Advisory Committee (SAC) continues to expand its activities, presence, and influence on project peer review, strategic matters, and advice. SAC also actively participated in the regional European Union water security and Mass Gatherings projects.
- The South Korean Party was active, providing internationally renowned experts who lectured during the ISTC supported EU CBRN CoE webinar series on COVID-19 response issues. Additionally, South Korea supported an in-person workshop in Kyrgyzstan on "Detection of antibodies to COVID-19 by enzyme-linked immunosorbent assay (ELISA)".
- In December, Field Exercise ARZ 2021 was successfully implemented in Beirut, Lebanon. The exercise focused on countering CBRN terrorism and was carried out under the leadership of the CBRN National Coordinator, the EU CBRN CoE, and the National Focal Point of Lebanon. The event was organized by the ISTC in collaboration with the United Nations Interregional Crime and Justice Research Institute, Fondazione SAFE, and the on-site assistance expert of the EU CBRN CoE. Its main objective was to raise awareness of chemical, radiological, and nuclear threats.
- LABPLUS Africa began in 2021, a 3-year European Union project that strengthens laboratory capacities in Africa against COVID-19 and other epidemics. In liaison with the Institute Pasteur in Dakar based in Senegal, LABPLUS will provide a regional hub to scale up on training.
- The ISTC, along with the Institute Pasteur in Cambodia, started a new project to support the biosecurity environment (insectarium and animal facility) through the modernization of the campus infrastructure.
- Japan actively funded two large projects in Armenia and Georgia related to "target-directed synthesis" and "screening of antiviral (SARS-COV) and antibacterial compounds", respectively, and a project in Kazakhstan on a study of radiation resistance of cables.
- The University of Leeds in the United Kingdom (UK) requested to be an ISTC Partner. Activities with them will start in 2022. This also shows our continued relationship with the UK, re-engaging as a separate country member after Brexit saw them exit the European Union.
- The United States Department of Energy's National Nuclear Security Administration (U.S. DOE/NNSA) continued active funding support and saw several new projects. Notably, the commencement of a project on the development of a National Nuclear Forensics Library in the Republic of Kazakhstan as a system for identification of nuclear and other radioactive materials and samples exchange.

The ISTC's growing regional expansion and project implementation outreach and presence has now expanded to approximately 100 countries around the world. We see that growing further in years to come, both in cooperation and collaboration with our partners at the EU CBRN CoE, Middle East Scientific Institute for Security, and with our sister organization STCU.

As the ISTC Chairman mentions in his statement, over the past year or so there have been numerous accusations against ISTC by the Russian Federation with their disinformation and propaganda campaign falsely accusing ISTC of involvement in supporting bio-weapons activities. They are blatantly false and have been discredited numerous times. The ISTC works in full transparency and is also supported by the Government of Kazakhstan, whom I wish to thank for hosting the ISTC headquarters in Nur-Sultan and for their continued support.

As ever I thank the Governing Board and Party Representatives for their longstanding support and commitment through another challenging year. I also extend my thanks to the ISTC staff who champion our cause at home and in the regions.

Despite all hardships, 2021 can be seen as a successful year and we look forward to continuing that success into 2022.

David Cleave
Executive Director, ISTC

MAJOR TARGETED INITIATIVES IN 2021

Nuclear Non-proliferation, Security & Safety Capacity Building

Support to Southern African States in Nuclear Safety and Safeguards

The Radiation Protection Authority for the Republic of Zambia, Radiation Protection Authority of Zimbabwe, Comite National de Protection contre les Rayonnements Ionisants of the Democratic Republic of Congo (DRC), Software Company, and the ISTC hosted a virtual and physical training on the use of the web-based system for monitoring nuclear and radioactive materials during transport. The training was in line with the objectives of the project that is funded by the European Union.

The main outcomes for the training and exercise were to ensure that the participants:

- Understand the principles of Information Tracking System (ITS) operation
- Work with the main modules and core functionality of the ITS
- Work with mobile application
- Understand legal and regulatory requirements in transportation of uranium ore concentrate and radioactive materials
- Enhance knowledge on safety and security of the transport of uranium ore concentrate and other radioactive materials
- Develop a harmonized system of accountancy, control, and transport of nuclear and radioactive materials at transboundary
- Familiarize stakeholders about the project and the web-based tracking system.

Nuclear Safety and Safeguards Support for Southern African States

Funded through the European Union, the ISTC assisted the 16 member states of the Southern African Development Community (SADC) to ensure safe uranium mining and transport. In September 2021, at a joint meeting of the Steering Committee and the nuclear regulators of the member countries, the African partners took stock of the progress achieved in project implementation. A series of webinars discussed the findings and recommendations in nine member countries and their regional reports. A training course on the Implementation of the International Atomic Energy Agency's (IAEA) Regulations for the Safe Transport of Radioactive Material was a welcome input to the capacity building for nuclear governance. The web-based ITS was deployed in half of the SADC member states to facilitate safe transport of radioactive material. It was tested in November 2021 through a real-time exercise on monitoring a delivery from DRC through Zambia to Zimbabwe.

Support the EU CBRN CoE for Eastern and Central Africa in Nuclear Security (Project 60)

Project 60 helps eleven African partners deny the misuse of orphan radioactive sources, improve the accounting of licensed sources, monitor their cross-border movements, and prevent illicit trafficking. This flagship project renders support to the European Union funded CBRN CoE in Eastern and Central Africa and contributes to stabilizing the nuclear security and oversight situation in the area. In June 2021, the project steering committee assessed the results achieved under pandemic restrictions, including reports on the capabilities for safe and secure management of radioactive sources, regulatory and legal reviews, four national emergency response plans, assessment of the equipment needs for mobile border patrols, and training for security-focused regulatory inspections. To date 364 national experts, including 52 women, increased their capabilities in the field of nuclear security. 43 people, including 9 women, are prepared after Train-the-Trainer courses to spread the accumulated knowledge to their peers.

Water Monitoring in Central Asia

Three projects relating to Water Monitoring Uranium legacy sites in Central Asia (CA) are currently managed by ISTC and funded by the European Union. The first project relates to hydrochemistry monitoring and risk assessment of mining & uranium tailing in transboundary river watersheds of CA countries and proposes a list of critical data exchangeable between countries. The second project aims to improve the capacity to collect and manage high-quality Earth observation data, enhance monitoring networks, and promote collaboration to enable regular data and information exchange. The third and most prominent project is to complete existing country systems to reach the regional watershed monitoring system level, allowing evidence-based decision support to standardize management practices and support decision-making at regional, national, and local levels.

These interconnected projects require advanced laboratory equipment, new robust and reliable automated sensors, sampling equipment, and a multiformat architecture database. In addition, establishing a standard operations manual and quality management system common to all countries will ensure the reliability and interoperability of data collection, storage, and analysis for rapid exchange between countries.

Biosafety & Biosecurity

Strengthening Laboartory Capacities in Africa against COVID-19 and other epidemics

A series of scientific activities, preparedness, and training measures were aimed at strengthening and empowering the African preparedness and response to SARS-COV-2 and future outbreaks of biological etiology in the continent. This project provides a greater patient impact at a larger scale.

This action proposes a strategic framework to reinforce preparedness and response to COVID-19 in Africa as well as to implement an innovative approach to address unmet needs of diagnostics and health services through mobile platforms delivering laboratory and health services to detect, respond, control, and prevent epidemics in Africa focusing on access driven business models, local capacities, and sustainability.

Through funding from the European Union, the scientific program aims to (i) address immediate needs for response and preparedness in Africa for COVID-19 in affected and non-affected countries through the concerted approach of Africa CDC/WHO, Afro/WHO/ECOWAS, along with Institut Pasteur de Dakar as a regional center designated by the three organizations and (ii) build a more sustainable and affordable ecosystem to support health systems with mobile platforms for diagnostics and health services provided by Praesens Care.

Training "Detection of Antibodies to COVID-19 by Enzyme-lilnked immunosorbent assay" (ELISA)

Up to ten laboratory doctors of the Central State Sanitary and Epidemiological Service and/or other laboratory specialists served as the focus group for this training. The purpose of the event was to train laboratory specialists on the ELISA method for the detection of antibodies (IgM, IgG). The results will strengthen the capacity of laboratory service specialists and obtain sustainable knowledge and practical skills in the application of COVID-19 diagnostic standards. The leading institute was Biotechnology Institute of the National Academy of Sciences of the Kyrgyz Republic, funded by South Korea.

2021 KEY TRAININGS & EVENTS

JANUARY

Assessment of Water and Land Resources in Small Transboundary Tributaries of Amu Darya River Basin using Earth Observation

Advancement of material-technical and regulation-methodological framework for Nuclear and Radiologic Materials Forensics in the Republic of Kazakhstan

FEBRUARY

As Kenya is becoming the first African State Party to the ISTC, a seminar introducing the ISTC Systems for project proposals offers relevant documentation and knowledge regarding the rules and procedures the ISTC follows.

MARCH

Train the Trainer Workshop at Eurasian National University, with participation of Kyrgz National University

Training seminar for Ministry of Education officials and academia

Plenary session of The Global Partnership Against the Spread of Weapons and Materials of Mass Destruction under the UK G-7 Chairmanship

ISTC webinar on Stakeholders Engagement and Presentation of the Namibia report MC 5.01 15B

APRIL

Webinars conducted jointly by the Kenyan Young Generation in Nuclear (June); Kenya Bureau of Standards (June); and the African Commission on Nuclear Energy (August) to support the EU CBRN CoE for Eastern and Central Africa in **Nuclear Security**

MAY

Africa and Central Asia participated in virtual webinars on the Benefits from Interregional Dialogue on Nuclear Governance

NUCLEAR SAFETY AND SECURITY

The ISTC was a panelist at the 2021 Joint INMM-ESARDA Annual Meeting held in Vienna on the theme Advancing Together: Innovation and Resilience in Nuclear Materials Management

JUNE

NUCLEAR SAFETY AND SECURITY

The ISTC became a participant in the IAEA International Project on Innovative Nuclear Reactors and Fuel Cycles and attended the 30th Meeting of the INPRO Steering Committee.

The ISTC organized Japan-funded efforts to **strengthen international scientific networks** by providing scientific & technical exchange opportunities, including the online participation in *STS forum Young Leaders Program 2021* by two young researchers from Kazakhstan and Kyrgyzstan.

JULY

INTER-REGIONAL NUCLEAR SAFETY EXCHANGE

In collaboration with the Almaty-based Nuclear Technology Safety Center, the ISTC arranged a virtual visit for representatives from the 16 member states of the South African Development Community to nuclear safety institutions and installations in Kazakhstan to boost the exchange best practices and experiences.

Training course for security inspectors from 12 African countries to support the EU CBRN CoE for Eastern and Central Africa in **Nuclear Security**

Seminar raising scientists' awareness in the field of dual-use **export control**

50 participants attended training and exercises on the use of the Information Tracking System (ITS) in DRC, Zambia, and Zimbabwe

Virtual study visits of African partners to Kazakhstan nuclear installations and uranium

Event held on *Fostering and Sustaining Non-Proliferation Verification Systems through Development of National and Regional Nuclear Safeguards* Capacities

AUGUST

The ISTC organized two seminars with participating institutes and ISTC SAC members to discuss hydrochemistry monitoring and risk assessment of mining and uranium tailing in transboundary river watershed of Central Asia countries

SEPTEMBER

The ISTC organized two virtual Steering Committee meetings with presentations on current activities related to *Strengthening Laboratory Capacities in Africa against COVID-19 and other epidemics: From set up in Senegal to scale up in Africa* (LABPLUS AFRICA)

NUCLEAR SAFETY AND SECURITY

ISTC attended the Annual Meeting of the IAEA International Network for **Nuclear Security** Training and Support Centres and became an observer to the network.

Along with NTI/AFRICSIS and organized by the James Martin Center for Non-proliferation Studies, the ISTC shared a regional workshop on the Amended CPPNM and an online course on nonproliferation.

NUCLEAR SAFETY AND SECURITY

Based on ISTC's experience in Africa, *Nuclear Security Systems in Africa* was presented at the AFCONE-AUC-IAEA-EU webinar

IAEA-CGULS annual meeting of the Coordination Group for Uranium Legacy Sites

SNL, ISTC & STCU Connect on upcoming webinar series Defining Security Best Practices for Global Bioscience Research Collaboration

AFCONE AUC UNEP IAEA webinar on Radioactive Waste Management & Environment Protection in Africa

3rd workshop within the Project Building Capacity on Multilateral Verification of Nuclear Disarmament

INSC/2016/379-634 "Equipment of a Radiochemical Laboratory and a Mobile Radiochemical Laboratory in Iraq"

OCTOBER

ISTC, AFCONE, and FNRBS held a training course for 34 participants on the implementation of the IAEA regulations for the safe transport of radioactive material

Event held on *African Uranium Resources: Exploration, Exploitation and Cooperation Opportunities*

NUCLEAR SAFETY AND SECURITY

The ISTC participated in IX International Conference 'Semipalatinsk Test Site: Legacy and Prospects of Scientific-Technical Potential Development' which was held at the National Nuclear Center of Kazakhstan and virtually.

PEACEFUL USES OF NUCLEAR ENERGY AND NUCLEAR APPLICATIONS

On the occasion of Kenya joining the ISTC, Kenya Bureau of Standards, Eastern Africa Association of Radiation Protection, and Kenya Young Generation in Nuclear organized an essay competition for young African experts and practitioners. The winners were announced during the Regional Metrology Conference in Mombasa, Kenya.

Executive Director at the ISTC addressed the 100+ participants at the Third African Youth Nuclear Summit, convened at the Accra International Conference Center.

NOVEMBER

Workshop on implementing an **Export Control** course and the relevance of the master program on Strategic Trade Control

Virtual side event to the International Conference on the Safe and Secure Transport of Nuclear and Radioactive Materials in support of Southern African States in **Nuclear Safety and Safeguards**

A 5-day webinar was organized under the EU CBRN CoE **Preparedness and Response for Mass Gatherings and other Health Threats in Central Asia (PRECA)**. Introductions were made for 100+ key experts from Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, and Uzbekistan.

DECEMBER

NUCLEAR SAFETY AND SECURITY

During the IAEA International Conference on the Safe and Secure Transport of Nuclear and Radioactive Materials in Vienna, the ISTC organized a side event called *Regional Cooperation on Transport Safety and Security in Southern Africa.*

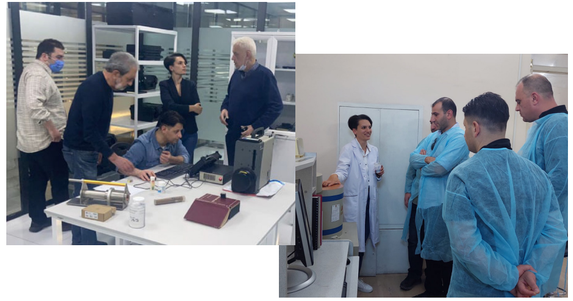
REPUBLIC OF ARMENIA

Commodity Identification Training

Four border trainings for customs officers were organized in Yerevan, Sisian, Vanadzor, and Gyumri. These trainings, funded by the U.S. DOE/NNSA, were conducted to inform the customs officers about the export control laws in Armenia, Armenian international obligations, and ways to identify suspected items from the point of view of dual use and military items. Attendees learned about red flags in documentation and practical exercises were administered. All participants were given a certificate of participation.

Responsible conduct of research: STEM scientist and peaceful life

Under the ISTC and with the financial support of the European Union, the "National Bureau of Expertise" State Non-Commercial Organization of the National Academy of Sciences of the Republic of Armenia has started research work about the responsible research practices for students, scientists, researchers and academicians in universities and research institutes. The main objective is to raise awareness of stakeholders and create a more responsible and safe environment for the scientific community, and to prepare a sustainable foundation for further legislative progress. Outreach to the scientific community and awareness raising within the community is critical to proper implementation of any technology control. All of this is widely recognized and frequently demanded, however, sustained outreach and awareness raising activities are rare.



Photos show the trainings on gamma spectrometry at CENS (Armenia, right) and MIA (Georgia, left)

Capacity Building in Nuclear Forensics and Enhancement of Regional Cooperation between Armenian and Georgian Authorities

Two trainings on gamma spectrometry of radioactive and nuclear materials and sources were implemented in Armenia and Georgia. Participants from the Ministry of Internal Affairs of Georgia attended this training, based on the training-of-trainers' concept. The stage on alpha spectrometry was continued and the schedule of upcoming trainings was developed.

A SWOT analysis was conducted in Armenian and Georgian nuclear forensic laboratories (NFL) to identify and develop action strategies. An inventory of the existing documentation in Armenian NFL was compiled, including statue, guidelines, and standard operational procedures. The updated and newly developed documents were transferred to the Georgian group for familiarization and subsequent development of a similar document for Georgian NFL.

As part of this assignment, and funding from the European Union, several meetings and roundtables were organized with the participation of all interested parties and the project expert group.

GEORGIA

Expanding Database of Antimicrobial Activity and Structure of Peptides (DBAASP) to Develop New Therapeutics

In collaboration with, and funded by, the U.S. Department of Health and Human Services, National Institute of Health, National Institute of Allergy and Infectious Diseases Office of Cyber Infrastructure and Computational Biology (U.S. DHHS/NIH/NIAID/OCICB), the ISTC continues to implement the DBAASP project in Georgia, an open-access, comprehensive database containing information on amino acid sequences, chemical modifications, 3D structures, bioactivities, and toxicities of peptides. DBAASP version 3.0 currently contains over 18,000 entries.

"Development of Sorbents - Carriers, Catalysts and Technology for Utilization of Methane and Carbon Dioxide" Greenhouse Gases

The ISTC supports research work on the development of efficient methods for the preparation of new solid-state micro/nano/mesoporous materials for catalyst carriers from natural raw materials from the deposits of Georgia and from the synthesized nanopowders of carbon nano-forms doped with the atomic/oxide clusters of Fe, Co, Ni which has been performed along with the development of technology for the preparation of the same carriers in the granular-powder form. Funding provided by Japan.

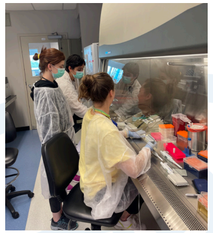
Members of Georgian Technical University (Tbilisi, Georgia) discussing the results (from left to right: Prof. Teimuraz Dzigrashvili, Prof. Elguja Kutelia, Dr. Lili Nadaraia, Mr. Tengiz Kukava, Dr. Olga Tsurtsumia)

Dirofilaria spp. Regional Distribution Assessment in Georgia and Armenia

This is the first attempt to describe dirofilariasis epidemiology in Georgia and Armenia by using molecular testing. The study will assess the effectiveness of the study methodology, and it might reveal distinctive genetic features of Dirofilaria spp. in South Caucasus. Funding provided by the European Union and Japan.

Study risk factors and molecular characteristics of extensively drug-resistant and pandrug-resistant hypervirulent *Enterobacteriaceae* in Georgia

Funded by Japan, the National Center for Disease Control and Public Health is investigating prevalence, risk factors, and molecular characteristics of extensively drug-resistant and pandrug-resistant hypervirulent *Enterobacteriaceae* in Georgia that helps to monitor the situation and minimize the threat that may come from them.



Expanding Global Knowledge of Tuberculosis (TB) by Establishing the TB Portal of Georgia

The TB project united scientists from Europe, the U.S. DHHS/NIH/NIAID/OCICB, and Georgia. A manuscript titled "Genomic diversity of M. tuberculosis from human lung resections reveals a high frequency of polyclonal infections and impact of granuloma microenvironment" was published in Nature Communications. Project participants visited Ukraine colleagues in Kharkiv to assist in mycobacterial DNA extraction procedure implementation. A manual on contamination control in molecular settings was written.

Visiting the Georgia TB Portals laboratory in Kharkiv, Ukraine to provide technical assistance

GEORGIA—EU CBRN COE PROJECT 53

On-site (on-job) trainings on biosafety and safe sample handling of COVID patients for Health Care Professionals in Georgia

Through funding from the European Union, the ISTC supported Georgia in training 480 health care professionals on biosafety and safe sample taking for COVID diagnostics in infected patients. Workshops were held in all 65 municipalities of Georgia and helpful training materials were distributed to regional healthcare facilities. Workshop efficiency will be analyzed based on pre/post tests and training evaluation forms, and results will be used to understand gaps and improve teaching approaches at future trainings.

COVID-19 Response

Using additional funding from the European Union in 2020, Project 53 continued to provide support to the Partner Countries of the EU CBRN CoE initiative from Central Asia and South-East and Eastern Europe.

Under this project, the ISTC provided close to € 1 million in COVID-19 supplies. The provisions were tailored to each of the recipient countries' needs and ranged from extraction and diagnostic equipment (polymerase chain reaction, ELISA instrumentation, ultrasound equipment, and biosafety cabinets), COVID-19 extraction and diagnostic kits, and personal protective equipment.

Additionally, more than € 300,000 was made available to conduct COVID-19 related trainings on biosafety, diagnostics, waste management, and infection control measures. The trainings were provided by contracted international organizations who conducted train-the-trainer workshops or by financially supporting local trainers to conduct biosafety training activities in country. As such, utilizing partner country trainers that were trained in an earlier phase of Project 53, more than 150 workshops (in-person and online) were performed


The workshop activities in different municipalities of Georgia


training over 2,000 specialists (medical staff, laboratory and veterinary specialists, border guards) in an effort to reinforce capabilities to address the pandemic.

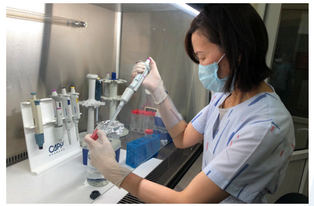
Co-funded by Project 53 and the U.S. Department of State (DOS), in November the 'Thin Blue Line' organization provided a regional train-the-trainer workshop focused on biosafety for law enforcement, emergency response, border guards, and custom control personnel. Currently, Project 53 and U.S. DOS (for ISTC member countries) are providing follow-up funding for the twenty-five newly trained trainers from 9 partner countries to provide workshops in their respective countries. Similarly, an Italian consortium (FORMIT and Sacco Hospital) started a regional workshop in December on Sanatory Infection Control Risk Assessment for Medical Facilities and Laboratories, which will be completed in March 2022. A Quality Management of Diagnostics training workshop is scheduled for 2022, which will cover the process of infectious disease diagnostics.

Provision of disease surveillance mobile labs to Uzbekistan

Two disease surveillance mobile labs were officially handed over to Uzbekistan as part of the original scope of EU CBRN CoE Project 53. These mobile labs, which were assembled by the Bundeswher Institute of Microbiology, will increase Uzbekistan's capacities to prevent, prepare for, and respond to disease outbreaks and enhance their disease surveillance capabilities in remote regions. Two workshops were conducted to train teams of Uzbek public health specialists in the use of the labs, including sample processing, extraction and diagnostics, data management, waste management, and other biosafety issues. With funding from the European Union, additional training workshops and field exercises are planned, and the hope is that both teams are fully operational by the end of 2022.

REPUBLIC OF KAZAKHSTAN

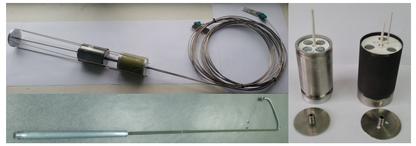
Development of a TB Portal in Kazakhstan



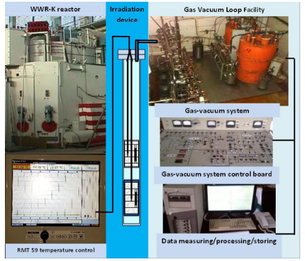
The ISTC continues to assist the TB Portal project in Kazakhstan, improving global research capabilities of the TB researchers by developing the Portal. In 2021, 922 pulmonary and extrapulmonary cases have been entered into the portal, as well as data from 350 cases, including drug-resistant forms. With funding provided by the U.S. DHHS/NIH/NIAID/OCICB, the development of an international TB Portal is underway with new opportunities for an integrated monitoring system for drug-resistant tuberculosis in Kazakhstan.

The study of properties of the irradiated SiC-matrix of the high temperature gas cooled reactor (HTGR) fuel element

Evolutional high performance nuclear fuels for the next generation small modular reactors (SMR)



Irradiation device



The general scheme of the equipment used for irradiation of SiC specimens

The series of neutron irradiation experiments using the WWR-K research reactor at the Institute of Nuclear Physics of the Ministry of Energy of the Republic of Kazakhstan was started in October. The irradiation targets are many kinds of samples of SiC material which could contribute to the development of fuels for a HTGR* with strengthened safety and higher performance. The irradiation temperature can be monitored and regulated online. The experiments will be continued to achieve up to 10^{25} m^{-2} (E_n>0.1MeV) neutron fluence. After the first irradiation cycle, a fluence of 1.1×10^{24} m^{-2} was achieved. Funding is provided by Japan.

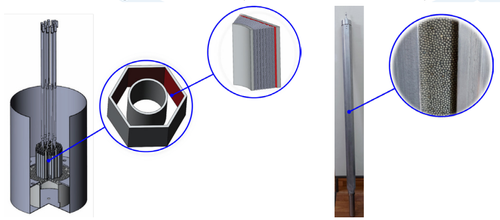
*HTGR is one of the SMRs and it can be used not only for generating electricity, but also for wider range of industrial application using its high temperature, such as hydrogen production.

More information on this study can be found using the following citation:
Calculation of Heating and Thermomechanical Loads in the Mockup of the Irradiation Capsule of the Irradiation Capsule of the WWR-K Rector, Chikhray E.V., Kulsartov T.V., Zaurbekova Zh.A., Askerbekov S.K., Gizatulin Sh.Kh., Shaimerdenov A.A., Sairanbayev D.S., Proceedings of III International Scientific Forum "NUCLEAR SCIENCE AND TECHNOLOGIES", Almaty, Republic of Kazakhstan, September 20-24, 2021 (ISBN 978-601-08-1370-0)

Experimental Study of New Type Reflector Element based on beryllium pebbles

High flexibility but cheaper reactor irradiation experimental technology

Funded by Japan, a new type reflector element was developed based on beryllium pebbles. The design has an internal cavity used as an irradiation position. It is possible to attain neutron spectrum adjustment by varying the beryllium pebbles packing fraction. A series of reactor experiments confirmed an easier way of generating the required neutron irradiation conditions. The performance of the new type of beryllium reflector was demonstrated using the critical facility in Institute of Nuclear Physics.



The structure of the new type reflector element

KYRGYZ REPUBLIC

Development of a Course on Export Control and Master's Program on Strategic Trade Control

The ISTC, with the support and funding of the European Union, together with the Center of Export Control, initiated a project to develop a course on Export Control followed by implementation of a master's program on Strategic Trade Control at the Kyrgyz National University at the Department of Customs Affairs, Faculty of Law of the University.

The implementation of the course and master's program on strategic trade control will allow the country to strengthen the system of control over sensitive transfers and minimize the risks of violation of legislation in the field of export control. Also, this will increase the awareness of customs officers, company employees, and government officials on export control issues.

Work moment of the workshop

Seismic Network Expansion in the Caucasus and Central Asia

During 2021, participating countries received drilling and seismic equipment to be installed in 2022 at 47 seismic stations in Kyrgyzstan, Kazakhstan, Tajikistan, and Armenia. Also, 14 strong motion stations have been installed in the territories of participating countries. Data from all sites are transmitted to the National Data Centers in real time mode, and are used in all issues relating to the seismic hazard assessment problem (Figure 1). In addition, geological maps of all country's participants have been digitized. Digitization will allow optimization of all geology related works. Funding provided by the U.S. DOE/NNSA.

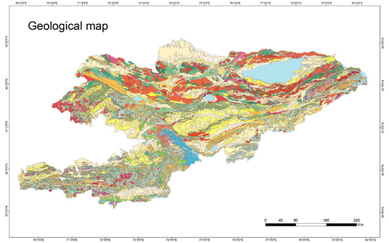


Figure 1 Geological map of seismic hazard assessment.

Expanding Global Knowledge of TB by Creating a TB Portal in the Kyrgyz Republic

By developing the Kyrgyzstan TB Portal, global research capabilities of researchers has improved. The portal collected medical images, microbiology lab results, treatment information, bacterial genome, as well as the social-economic and clinical data from the anonymized records of patients, and was made available to the worldwide community of TB researchers. The Kyrgyzstan TB Portal is funded by the U.S. DHHS/NIH/NIAID/OCICB and a part of the multi-country TB Data Portals with other portal sites in Azerbaijan, Belarus, Georgia, Moldova, Romania, Kazakhstan, China, South Africa, India, and Congo. The Portal addresses the needs of several categories of users including doctors, laboratory specialists, scientists, and students.

The following activities took place in 2021:

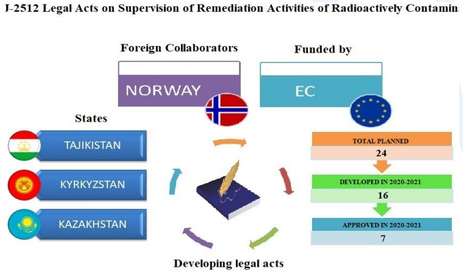
- Training NRL staff and clinicians;
- Online trainings for National Center of Phthisiology staff;
- Data collection, verification, and entering data into the TB Portal;
- Discussion of the results.

Throughout 2021, 759 samples from 224 patients were entered into the TB Portal. DNA was isolated from 98 samples and 98 sequencing data were uploaded.

REPUBLIC OF TAJIKISTAN

Legal Acts on Supervision of Remediation Activities of Radioactively Contaminated Areas

Funded by the European Union, a number of legal acts were developed, which will make a significant contribution to the process of remediation of territories contaminated with radioactive waste from the uranium industry in Tajikistan, Kyrgyzstan, and Kazakhstan.
The legal framework in this area is revised in accordance with international requirements and recommendations of the IAEA and the European Commission, which will help the operators of uranium tailings in ensuring the radiation safety of personnel and the public during remediation work. The developed documents can be used by all stakeholders in the region, who have problems with the waste management of the uranium industry.



Regional Water Monitoring System in Tajikistan, Kyrgizstan and Uzbekistan

The Water Monitoring System is part of the Environmental Remediation Account for Central Asia, which is managed by the European Bank for Reconstruction and Development and a part of the IAEA Strategic Master Plan for Environmental Remediation of Uranium Legacy Sites in Central Asia. The agreement with the ISTC for € 3 million funded by the European Union was signed in December 2019 with the initial transfer of € 300,000 to initiate the development of the project.

This project was planned to be the second stage of the regional project "Establishment of a legislative and regulatory framework, regional watershed monitoring system and capacity building for remediation of uranium mining legacy sites in Central Asia, 2014 - 344980", implemented from 2014 to 2017 by a consortium headed by the Austrian company ENCO.

EU CBRN CoE Project 53 - "On-site (on-job) trainings on biosafety and safe sample handling of COVID patients for Health Care Professionals in Tajikistan"

Funded by the European Union, the ISTC supported Tajikistan in preparation of a critical number of health care professionals on biosafety and safe sample taking for COVID diagnostics in infected health care workers. In March, a training course on the topic of "Ensuring biological safety and biological protection for officers of the first line of defense" was conducted in Dushanbe.
A training course was also held at the Regional Training Center of the CBRN SSA of the National Academy of Science on weapons of mass destruction, nonproliferation, and export control for the countries of Central Asia, the Caucasus, and Afghanistan. The course was planned for specialists of the Customs Service of the Republic of Tajikistan and the Border Guard Service of the State Committee for National Security of the Republic of Tajikistan. To conduct these courses, local experts Akhmedov Matin, Kavrakova Zubayda, and Sufiyev Alimahmad were involved as lecturers and trainers.
The workshop's efficiency will be analyzed based on pre/post tests, training evaluation forms, and the results will be used for understanding gaps and improving teaching approaches in the future.

Workshop activities in Tajikistan

PROJECTS COMPLETED IN 2021

TITLE	LEAD INSTITUTE	FUNDED BY	COLLABORATOR COUNTRY
Optical sensor with a radially-quadratic transmission filter	Institute for Physical Research		
Bovine TB in Georgia	I. Beritashvili Center of Experimental Biomedicine		
Molecular characterization of swine influenza viruses	Institute of Microbiology and Virology		
Laboratory Strengthening Project in Armenia	-	Partner	
Logistical Support for Threatening Laboratory Systems in the Sanitary Epidemiological Service (SES)	-	Partner	
P54 Training Equipment for CBRNEM Training Centres in Iraq, Jordan and Lebanon	-		-
Peaceful uses of nuclear energy	The Vienna Centre for Disarmament and Non-Proliferation / Middlebury Institute	Partner	
Information-Sharing Support in Central Asia and Belarus	-	Partner	

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PARTIES Contact Information

Republic of Armenia
Sargis Hayotsyan
Chairman
Science Committee
Ministry of Education, Science, Culture and Sport of the Republic of Armenia

European Union
Sorin Popa
Senior Program Manager
Service for Foreign Policy Instruments
European Commission
Stability, Security, Development and Nuclear Safety Unit

Georgia
Jaba Samushia
Director General
Shota Rustaveli National Science Foundation of Georgia

RusudanJobava
Head of International Relations and Fundraising Office
Shota Rustaveli National Science Foundation of Georgia

Japan
Kasara Tatsuya
Deputy Director
International Science Cooperation Division, Disarmament, Non-proliferation and Science Department, Ministry of Foreign Affairs

Republic of Kazakhstan
Dinara Sekerbayeva
Head
International Cooperation Department of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan

Republic of Korea
Lee Young-Ouk
Principal Researcher
Korean Atomic Energy Research Institute

Kyrgyz Republic
Sharipa Zhorobekova
Full member-Academician
National Academy of
Science of Kyrgyz Republic

Norway
Tamara Zhunussova
Senior Adviser
Department for Nuclear Safety and Environmental Protection Section for International Nuclear
Safety and Security
Norwegian Radiation and Nuclear Safety Authority

Republic of Tajikistan
Farhod Rahimi
President
Tajikistan National Academy of Sciences

United States of America
Barbara Hall
International Relations Officer
Office of Cooperative Threat Reduction
Bureau of International Security and Nonproliferation
U.S. Department of State

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Republic of Korea	**Lee-Young Ouk**

Secretariat Contact Information
Nur-Sultan, Kazakhstan
Tel: +7 7172 769534
Fax: +7 7172 769534
istcinfo@istc.int
www.istc.int

Executive Director
David Cleave
Nur-Sultan
Tel: +7 7172 769513

Deputy Executive Director
Aidyn Turebayev
Tel: +7 7172 769511

ISTC Branch Office, Armenia
Yerevan, Republic of Armenia
Hamlet Navasardyan
Tel: +374 60 62 35 17
Fax: +374 10 58 44 83

ISTC Branch Office, Georgia
Tbilisi, Georgia
Irina Khomeriki
Tel: +995 32 2223 700
Fax: +995 32 2912 386

ISTC Branch Office, Kyrgyz Republic
Bishkek, Kyrgyz Republic
Dinara Kerimbaeva
Tel: +996 312 431171
Fax: +996 312 431171

ISTC Branch Office, Tajikistan
Dushanbe, Republic of Tajikistan
Mukhabatsho Khikmatov
Tel: +992 37 227 8737
+992 918 64 7107
+992 934 01 0172
Fax: +992 37 227 9394

ISTC
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INTERNATIONAL SCIENCE AND TECHNOLOGY CENTER

istcinfo@istc.int
www.istc.int