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**Conference on Facilitating the Entry into Force  
of the Comprehensive Nuclear-Test-Ban Treaty**  
New York, 20 September 2017

**BACKGROUND DOCUMENT BY  
THE PROVISIONAL TECHNICAL SECRETARIAT OF  
THE PREPARATORY COMMISSION FOR  
THE COMPREHENSIVE NUCLEAR-TEST-BAN  
TREATY ORGANIZATION  
PREPARED FOR THE CONFERENCE ON FACILITATING  
THE ENTRY INTO FORCE OF THE CTBT (NEW YORK, 2017)**

**TREATY**

1. The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all nuclear test explosions, whether for a military or any other purpose. It covers all environments and does not set a threshold from which the prohibitions should apply. The preamble of the Treaty states that its objective is “to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects” and “to the process of nuclear disarmament”.
2. The CTBT, and the international norm of non-nuclear testing, have grown in strength since the adoption of the Treaty in 1996. In order to enter into force, the CTBT must be ratified by all 44 States listed in Annex 2 to the Treaty. These are the States which formally participated in the work of the 1996 session of the Conference on Disarmament, thus having contributed to the final stage of the negotiations on the CTBT, and which appear in the lists, compiled by the International Atomic Energy Agency (IAEA), of States with either nuclear power reactors (as of April 1996) or nuclear research reactors (as of December 1995).
3. Significant progress has been made towards the goal of entry into force and universalization of the Treaty. To date, the CTBT has been signed by 183 States and ratified by 166 States, including 36 of the 44 States listed in Annex 2. Since the 2015 Article XIV conference, two countries completed their ratification procedures: Myanmar and Swaziland in September 2016.



## **2015 ARTICLE XIV CONFERENCE**

4. Under Article XIV, if the Treaty has not entered into force three years after the date of the anniversary of its opening for signature, a conference of those States that have already ratified it may be held to decide by consensus what measures consistent with international law may be taken to accelerate the ratification process and to facilitate entry into force. States Signatories will also be invited to attend the conference.
5. The ninth Article XIV conference<sup>1</sup> was held on 29 September 2015 in New York with more than 90 States participating. In addition, several international and regional organizations as well as non-governmental organizations attended. The conference adopted a Final Declaration calling upon all States which had not yet done so to sign and/or ratify the Treaty (CTBT-Art.XIV/2015/6, Annex). The declaration includes a number of measures to promote the entry into force of the CTBT.
6. In the course of the follow-up to the 2015 Article XIV conference, and in accordance with paragraph 9(c) of the Final Declaration, Japan and Kazakhstan, which served as the Presidency of the conference, were selected as coordinators of the process “to promote cooperation aimed at promoting further signatures and ratifications”. On 13 March 2017, at informal consultations within the framework of this ‘Article XIV process’, Belgium and Iraq were appointed to serve as Presidents-designate in preparing for the 2017 Article XIV conference in New York.

## **PREPARATORY COMMISSION**

7. In advance of the entry into force of the Treaty and the establishment of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), a Preparatory Commission was established by States Signatories on 19 November 1996. Its purpose is to carry out the necessary preparations for the effective implementation of the CTBT and to prepare for the first session of the Conference of the States Parties to the Treaty. Altogether 183 States are members of the Commission.
8. The Commission has two main activities. The first consists of undertaking all necessary preparations to ensure that the verification regime foreseen by the CTBT is capable of fulfilling its operational mission at entry into force. The second is the promotion of signature and ratification of the Treaty to achieve entry into force. The Commission is made up of a plenary body responsible for directing policy and composed of all States Signatories, as well as a Provisional Technical Secretariat (PTS) which assists the Commission in its duties and carries out such functions as the Commission determines.

## **PROVISIONAL TECHNICAL SECRETARIAT**

9. As of 30 June 2017, the PTS comprised 280 staff members from 87 countries. The number of staff at the Professional level was 191. The PTS is committed to a policy of equal employment opportunity, with a particular emphasis on improving the representation of women, especially in the scientific and technical areas within the

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<sup>1</sup> Previous Article XIV conferences were held in Vienna (in 1999, 2003 and 2007) and in New York (in 2001, 2005, 2009, 2011, 2013 and 2015).

Professional category. Sixty-two women held Professional positions as of 30 June 2017, corresponding to 32.46% of the Professional staff.

10. The approved Budget of the Commission for 2017 amounts to US\$130.09 million. From 1997 up to and including the financial year 2017, the total budgetary resources amounted to \$1188.45 million and €742.31 million. In equivalent US dollars this corresponds to a total of \$2120.99 million calculated using the budgetary rate of exchange of €1:\$0.796. Of this total, 79.6% has been dedicated to verification related programmes, including \$434.88 million (21%) for the Capital Investment Fund for the installation and upgrade of IMS stations.
11. In 2014, the Commission completed implementation of an International Public Accounting Sector Accounting Standards (IPSAS)-compliant Enterprise Resource Planning system within budget and on time. Since then, the Commission has successfully issued IPSAS-compliant financial statements for the three consecutive years and received an unqualified audit opinion.

## **VERIFICATION REGIME**

12. The CTBT provides for the establishment of a unique global verification regime that consists of an International Monitoring System (IMS), a consultation and clarification process, on-site inspections (OSIs) and confidence building measures. Data from IMS stations are to be sent via a secure global satellite network (the Global Communications Infrastructure (GCI)) to an International Data Centre (IDC) for processing and analysis, and IMS data and IDC products are to be made available to States.

### **International Monitoring System**

13. The IMS is to consist of a network of 321 monitoring stations and 16 radionuclide laboratories. The mission of these facilities is to produce data for the detection of nuclear explosions. These data are to be provided to States Parties for verification of compliance with the Treaty after entry into force.
14. The momentum to complete the IMS network continues at a moderate pace. As of 30 June 2017, 292 (90%) of the IMS stations had been installed, of which 275 had been officially certified as meeting the specifications of the Commission. In addition, since mid-2015, two radionuclide laboratories were certified for particulate analysis capability, bringing the total to 13 (81%), and a second laboratory (RL16, United States of America) was certified for noble gas analysis capability. The certification of hydroacoustic station HA4 (Crozet Islands, France) in June 2017 marks a major milestone for the IMS, with the hydroacoustic component of the IMS network now fully established and operational. Progress was also made towards completing the installation of additional IMS stations. Following the recognition of the importance of noble gas monitoring after the events in the Democratic People's Republic of Korea in 2006, 2009, 2013 and 2016, the PTS has continued to emphasize noble gas technology. As of 30 June 2017, of the 40 noble gas detection systems envisaged by the Treaty, 31 had been installed, of which 25 systems have been certified (63%).

15. In addition, the continued political support from a number of countries hosting IMS facilities brings the prospect of a complete IMS network closer.

### **International Data Centre**

16. The mission of the IDC is to support the verification responsibilities of States by providing data, products and services necessary for effective global monitoring after the entry into force of the Treaty.
17. The IDC continues in its provisional mode of operation and supports States Signatories by acquiring and forwarding continuous real time data, selected data segments and radionuclide spectra from the IMS. The IDC processes the IMS data along with compiled meteorological data and distributes the resulting products to support the verification responsibilities of States as well as their civil and scientific efforts. On average 11 terabytes of data and products are distributed every year. States are supported through an online help desk, data retrieval services, training courses, workshops, software and equipment.
18. The GCI receives and distributes IMS data and IDC products. Using a combination of satellite, terrestrial and Internet technologies, this communications infrastructure now spans over 100 countries and territories. Subnetworks are being operated in eight States Signatories to complement the GCI. Adjustments to the physical infrastructure and procedures are made from time to time to ensure that the GCI continues to transmit data and products securely with 99.5% availability every year.
19. Through the International Noble Gas Experiment, the Workshop on Signatures of Man-Made Isotope Production, support from European Union Council Decision VI, contributions in kind from the United States of America, and voluntary contributions from Japan, the global radionuclide background signature and the effects of normal operational emissions from nuclear facilities on the IMS network have been studied. Efforts are being made in partnership with industry to better understand the impact of emissions so that the detection capability of the IMS noble gas systems is as sensitive as possible to nuclear explosions.
20. Since 2015, significant software enhancements have increased the quality of automatic processing results for particulate samples and reduced the analyst workload. Through multiple measures, ranging from tuning processing parameters to increased automation in radionuclide processing, false positives in automatic mode were reduced by more than 60% compared with 2014. An improvement of more than 100% was achieved in the percentage of radionuclide samples with consistent auto-categorization results. Further enhancements released in 2016 improved the consistency of results both for automatic and reviewed radionuclide reports.
21. The first phase of IDC re-engineering was completed in December 2015. The undertaking modernized major aspects of IDC software, such as the system for IMS data and IDC product dissemination, the middleware software that controls the automatic processing of seismic, hydroacoustic and infrasound data, and software modules that perform quality control on waveform segments. The second phase of IDC re-engineering was initiated in 2014 and completed in April 2017. It resulted in the

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design of a new unified software architecture that will guide further development and sustainment of the IDC processing software.

22. In 2016, the PTS released a major extension of the current seismic, hydroacoustic and infrasound data analysis software provided to National Data Centres (NDCs) with new functionalities, in particular in the area of infrasound processing and real time automatic processing. The project was supported financially through EU Council Decision V and EU Council Decision VI. The new version of the software enables NDCs to more easily combine IMS data and IDC products with data from local and regional stations and from other global networks.

### **Sustaining and Maintaining the IMS**

23. In accordance with Article IV of the Treaty, the Technical Secretariat supervises, coordinates and ensures the operation of the IMS and its component elements. Preparing a global verification regime is not just about building stations. It is about taking a holistic approach to establishing and sustaining a system that meets the verification requirements of the Treaty and ensures minimal downtime of IMS facilities. Operational experience with the system has increased over time, leading to the establishment of an IMS sustainment structure and concerted efforts for more effective operations, preventive maintenance, logistical and engineering strategies and programmes. These sustainment activities are essential to preserve the investment already made by States Signatories.
24. The PTS has continued to develop its expertise in configuration management, logistics support analysis, establishment of equipment support contracts, shipping and customs clearance, and storage and advance location of spares to ensure availability of replacement equipment and consumables on site. It has also continued to recapitalize IMS facility components reaching the end of their operational lives and to address unscheduled maintenance in a timely fashion. Furthermore, owing to the central role played by station operators in resolving problems on site and hence contributing to high levels of data availability, the PTS has continued to invest in local training courses for station operators that are tailored to their needs. Monitoring and tracking software has been enhanced to further facilitate the tasks of monitoring, detecting and resolving incidents in the IMS network.
25. As the IMS network grows, the costs associated with its sustainment also rise. Provisions are in place to address peaks in obsolescence of IMS equipment in the foreseeable future. In addition, the PTS is undertaking an in-depth study of the life cycle of IMS stations, including their costs, to optimize the sustainment of the IMS.
26. Operation and maintenance of IMS auxiliary seismic stations are the responsibility of the host countries. While some progress has been made over the last two years, resulting in improved levels of data availability and a better understanding of roles and responsibilities for sustainment, further efforts involving close collaboration with States Signatories are required. The European Union provides financial support for IMS auxiliary seismic stations that do not belong to parent networks and are hosted by developing countries or countries in transition.

27. Increasing the number of facility agreements and arrangements between the Commission and the States hosting IMS facilities is important for providing the required support for the functioning and sustainment of the IMS. As of 30 June 2017, facility agreements have been signed with 49 of the 89 host States, and 41 of these agreements are in force. The development and implementation of mechanisms such as timely customs clearance and tax exemption for equipment brought into an IMS host State has proven to be highly relevant.
28. The PTS has continued to focus on engineering and development activities with the aim of improving the robustness of IMS monitoring facilities and enhancing the performance and capabilities of associated technologies. This is being achieved through designing, validating and implementing solutions throughout the life cycle of IMS stations.
29. Significant progress has been made in the quality assurance/quality control (QA/QC) programme of the IMS network. The calibration procedures for T phase hydroacoustic stations are now complete. Calibration of T phase hydroacoustic stations is now included in the scheduled calibration of primary and auxiliary seismic stations that is performed on an annual basis with the support of station operators. Similarly, a comprehensive QA/QC programme is in place for all radionuclide stations. Advancements in the calibration of infrasound stations were also made, with in situ calibration capability now implemented at three IMS stations.
30. Up to date and reliable technical documentation for each IMS station is essential to ensure its sustainability and to maintain a high level of data availability. In 2016, the PTS made substantial progress populating its Quality Management System (QMS) with station specific documentation. By 30 June 2017, full sets of documentation had been developed for 30 stations, and partial information had been acquired for an additional 19 stations.
31. Technology road maps that capture knowledge and developments in the technological and scientific communities, the requirements of stakeholders and the benefits derived from strategic partnerships were continuously reviewed and updated by the PTS. This has allowed the PTS to keep abreast of technological advances and of the next generation engineering designs that it will implement, resulting in a more robust and cost effective IMS while enhancing its performance and maintaining its relevance.
32. Significant efforts and re-engineering of the information technology infrastructure has ensured high availability of all information technology equipment and systems in use. For instance, the availability of infrastructure supporting critical IDC verification capabilities was 99.8% for the period January to June 2017. Through a combination of different approaches, including redundancy, secure storage and clustering, the effects of hardware failure and human error have been minimized.
33. Since 2013, a new definition of data availability has been employed that accounts for the quality of the raw data. The PTS operations and sustainment strategy and the joint efforts with delegations, national governments, station operators and national institutions have been rewarded. High levels of data availability from IMS stations are being achieved, and initiatives in place should result in enhanced levels in the medium

term. In 2016, the data availability levels for infrasound and primary seismic station networks reached an average of 95%. Data availability for the hydroacoustic network and auxiliary stations for the same period was 84.6% and 86.0% respectively. The radionuclide network performed at a level of 90.3% (particulate stations) and 90.9% (noble gas systems) in 2016.

34. Post-certification activity (PCA) contracts, agreements and arrangements support station operators in operating and maintaining primary IMS stations after certification. There are 153 PCA contracts for certified primary IMS stations. The PTS has developed standardized operation and maintenance plans, which by the end of 2016 had been implemented by 104 stations. This approach helps to keep operational costs at a reasonable level while ensuring sufficient funding to keep the stations well maintained. Keeping the operational costs of IMS stations at a reasonable level is a joint responsibility of the PTS and the host country.

### **On-Site Inspections**

35. On-site inspections (OSIs) represent the ultimate verification measure of the CTBT in order to address possible compliance concerns with the Treaty. An OSI can only be invoked after the entry into force of the Treaty. The sole purpose of OSI is to clarify whether a nuclear weapon test explosion or any other nuclear explosion has been carried out in violation of the Treaty and to gather facts which might assist in identifying any possible violator.
36. The Commission has continued to build up the OSI verification regime in accordance with Treaty requirements. Considerable progress has been made with the implementation of the OSI action plan, commencement of the third training cycle for inspectors as well as the commencement of the project to construct a permanent Equipment Storage and Maintenance Facility.

### ***OSI Action Plan***

37. The action plan commenced with 43 projects categorized into five functional categories:
- OSI policy development, methodology and documentation;
  - OSI operations and operations support;
  - OSI techniques and equipment development;
  - OSI inspectorate development;
  - OSI infrastructure development.

### ***Third Training Cycle for Inspectors***

38. The third training cycle as a further development of the OSI training programme builds upon the two previous training cycles. Its basic model originates in the long range plan for the OSI training and exercise programme (CTBT/PTS/INF.475) and draws on the evaluations, recommendations, lessons and experience from the first and second

training cycles leading up to the Integrated Field Exercise (IFE) in 2014 as well as from the IFE itself.

39. WGB agreed with the proposed training cycle and its implementation at its Forty-Sixth Session. Subsequently, the PTS circulated a note verbale calling upon all States Signatories to nominate suitable candidates for participation in the third OSI training cycle for surrogate inspectors through their Permanent Missions, in accordance with the announcement which included a description of requirements and qualifications.
40. The cycle commenced in October 2016. To date, the introductory block has been completed. It comprises three courses: the Introductory Course (core inspection skills), the Health Safety and Security Course and the In-field Operations Support Course (logistics and sustainment of an inspection team in the field).

#### ***Permanent Equipment Storage and Maintenance Facility***

41. In 2015, the PTS signed an agreement to lease premises of the Austrian Institute of Technology in Seibersdorf, Austria, as a temporary storage area (TSA) to house PTS equipment after the closure of the Equipment Storage and Maintenance Facility (ESMF) in Guntramsdorf, Austria. Full access to the TSA was granted on 15 December 2015, and the lease can be extended until 31 January 2019. The TSA of the Commission houses the majority of OSI equipment and allows the conduct of limited maintenance, testing and calibration activities.
42. At its Forty-Seventh Session, the Commission decided to fund the construction of a new ESMF from its 2014 cash surplus balance, with the remainder of the funding to be provided through the Regular Budget.
43. The new facility, to be located in Seibersdorf, Austria, is presently in the design phase. The project is planned to be completed in January 2019.

#### **ANNOUNCED NUCLEAR TESTS BY THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA**

44. In clear defiance of the established norm against nuclear testing, the Democratic People's Republic of Korea conducted two nuclear tests in 2016: on 6 January and 9 September. These events once more highlighted the urgency of the entry into force of the Treaty.
45. The performance of the verification system was timely and effective and proved the value of the investment made in its establishment.
46. The announced tests were detected by the IMS facilities and the data were shared with States Signatories in near real time. The States Signatories received the reviewed data products within the defined time lines. The Commission also held briefings to discuss the findings of the verification system.

47. The response of the IMS and the IDC to the two tests established that their capabilities are nearing full maturity. In addition, the tests underlined the significance of the OSI mechanism as a complementary element of the verification regime and the need for constant testing and validation of the regime.
48. The international reaction to the announced tests was swift and strong. Many countries condemned the nuclear tests and considered such actions to seriously threaten international peace and security. They called on the Democratic People's Republic of Korea to cease any further tests and to immediately sign and ratify the Treaty.

## **QUALITY ASSURANCE AND PERFORMANCE MONITORING**

49. The PTS undertakes to continuously enhance effectiveness and efficiency through its QMS, which encompasses all contributing PTS processes and work products. One of the functions of the QMS is to identify and implement key performance indicators for evaluating these processes and products. The overall aim of the QMS is to support the objective of consistently meeting verification system requirements.
50. The performance monitoring and testing framework was established by the PTS to create a culture in which quality is monitored as part of normal activities so that stakeholders, such as States Signatories and NDCs, have assurance that the Commission is in compliance with the requirements set forth in the Treaty and its Protocol. As part of this process, NDCs, which use the products and services of the IDC, meet in annual workshops to provide their feedback.
51. The 2016 NDC Workshop, which took place on 9-13 May 2016, was hosted by the NDC of Ireland, the Dublin Institute for Advanced Studies. The objectives of the workshop were to provide a forum for NDC experts to share experience in fulfilling their verification responsibilities and to provide feedback on all aspects of the data, products, services and support provided by the PTS.
52. New landmarks in the exchange of experience and knowledge have been reached through a series of NDC Preparedness Exercises (NPEs) conducted by the NDCs. NPEs represent a further advance along the learning curve for NDCs to perform their verification duties, enhancing the dialogue and cooperation between experts in the various CTBT monitoring technologies and the PTS.

## **2017 SCIENCE AND TECHNOLOGY CONFERENCE**

53. Mindful of the obligation under Article IV of the Treaty that States Parties cooperate with the CTBTO “in the improvement of the verification regime, and in the examination of the verification potential of additional monitoring technologies”, the CTBT: Science and Technology process was established in 2006 to engage with the global scientific and technological research community. This process continued in June 2017 with the sixth in a series of biennial conferences hosted by the Commission in the Hofburg Palace, Vienna, with support from the Federal Ministry for Europe, Integration and Foreign Affairs of Austria and the European Union. Attendance was over 800, with

100 oral presentations, over 400 research posters, 8 panel discussions and an opening session with high level invitees providing a political and diplomatic context. The conference provided a forum for the Commission to maintain awareness of emerging technologies relevant to CTBT verification. It explored methodologies for monitoring the performance of the verification regime and considered topics related to capacity development and the education and training of those who contribute to the installation and maintenance of relevant monitoring facilities and to data processing and analysis. It also highlighted monitoring for nuclear explosions in a global context and put special emphasis on the active participation of the CTBTO Youth Group.

## **INTEGRATED CAPACITY BUILDING AND TRAINING**

54. The Commission accords high importance to training and capacity building to improve the capacity of States Signatories to effectively fulfil their verification responsibilities under the Treaty and to benefit fully from their participation in the verification regime, in particular through the use of IMS data and IDC products (for verification as well as for their own civil and scientific applications).
55. In addition to traditional training methods, information and communication technologies such as e-learning offer broader possibilities to expand and further enhance capacity building. Training and capacity building are provided to States Signatories that have access to IMS data and IDC products (more than 1800 authorized users from 135 States) as well as to those that do not have access (48 States) and those that do have access but make limited use of the information.
56. The training targets a variety of audiences, namely IMS station operators, technical staff of NDCs, OSI inspectors, officials, diplomats and PTS staff. Currently, 45 e-learning modules, 29 of which are in the official languages of the United Nations, are available. Since 1999, more than 1600 NDC technical staff from 120 States Signatories have been trained. The current training programme includes annually around 20 NDC and station operator events, for all four technologies.
57. The need to invest in the next generation of nuclear non-proliferation and disarmament specialists is a key driver of the education activities of the Commission. These aim to broaden knowledge of the Treaty and to develop capacities in States Signatories to effectively confront the political, legal, technical and scientific challenges facing the Treaty and its verification regime. To achieve this objective, the Commission continued to develop its Knowledge and Training Portal, complete with issue specific training modules, a database of CTBT related resources and materials, and an archive of lectures on the Treaty and the science and technology that underpin its verification regime. The Commission is also the first security based international organization to create a free and open educational platform on iTunes U, which allows users to access and download lectures, documents and presentation files on the policy, legal, technical and scientific aspects of the CTBT.
58. The CTBT Symposium “Science and Diplomacy for Peace and Security: the CTBT@20” was held from 25 January to 4 February 2016 and served as the first in a series of events in the year of the 20th anniversary of the CTBT. The symposium

comprised online e-learning modules and a two week live, seminar style symposium held in Vienna and streamed online. Topics included nuclear testing and the arms race, the role of the CTBT in the nuclear non-proliferation regime, and multilateral arms control and verification. The symposium concluded with a simulation exercise on a future CTBTO Executive Council deliberation on an OSI request, which enabled the participants to apply concepts and ideas discussed during the symposium.

59. Approximately 650 participants from all of the geographical regions of the Treaty took part in the symposium in person and online. Participants included Vienna based diplomats, representatives of other international organizations, NDC staff, station operators, as well as academics and representatives of civil society and media. All of the non-ratifying and non-signature Annex 2 States, with the exception of the Democratic People's Republic of Korea, were represented.
60. The symposium saw the launch of the CTBTO Youth Group, an interdisciplinary network of young professionals and students. As of July 2017, the Youth Group consisted of over 200 members from all of the geographical regions.
61. Building on its experience in organizing CTBT policy related courses for diplomats and emerging policy makers, as well as its engagement with the academic community through the provision of CTBT Academic Forums, the Commission incorporated sessions and workshops on the role of the CTBT in disarmament and non-proliferation, and on mainstreaming CTBT issues into academic curricula, into the CTBT: Science and Technology 2017 conference. A programme for young scientists and the CTBTO Youth Group was also integrated into the conference.
62. Support for the United Nations Disarmament Fellows initiative continued, with a course on the Treaty hosted by the Commission in September 2016. Another course is being prepared for September 2017.

## **OUTREACH ACTIVITIES**

63. The purposes of the PTS outreach activities include: enhancing understanding and implementation of the Treaty among States, media, civil society and the general public; promoting signature and ratification of the Treaty and thereby its universality and entry into force; assisting States Signatories in their national implementation of verification measures and in gaining benefits from the peaceful applications of the verification technologies; and assisting in promoting the participation of States Signatories in the work of the Commission.
64. Most of the interaction with States to raise awareness about the Treaty and promote signature and ratification takes place in the context of bilateral consultations and correspondence. While special emphasis has been placed on those States listed in Annex 2 to the Treaty and those hosting IMS facilities, virtually all States have been approached by the PTS in its outreach efforts since September 2015. In addition to regular dialogue with Permanent Missions in Vienna and those representations based in Berlin, Geneva and New York, visits by PTS staff were conducted in a number of

capitals. Consultations were also held, at all levels, on the margins of global, regional and subregional conferences and other gatherings.

65. A number of events and activities are organized by the PTS which allow for bilateral consultations with participants from both signatory and non-signatory States. For example, a national seminar in Myanmar took place on 6-7 July 2016. The seminar was held to facilitate the Government of Myanmar's efforts to complete its ratification process. On the Myanmar side, the opening remarks were delivered by the Minister of State for Foreign Affairs U Kyaw Tin. Present at the seminar were officials from the Ministry of Foreign Affairs, the Ministry of Defense, the Ministry of Transport and Communications, the Ministry of Education and the Attorney General's Office. The Director of the On-Site Inspection Division headed the PTS delegation. Australia co-organized the event.
66. On 27-28 October 2016 approximately 40 scientists from China, India, Norway, Pakistan, the United States of America and the PTS convened in Beijing, China, for the Second Scientist-to-Scientist Workshop, which was funded through a Development and Disarmament Grant from the Norwegian Ministry of Foreign Affairs. The workshop provided a forum for substantive technical discussions between scientists from Annex 2 States while also developing capacity in technical areas of Treaty verification. The workshop aimed to build relationships between scientists who are involved in fields related to nuclear test monitoring in the remaining Annex 2 States, as well as to help establish trust and confidence in the Treaty's verification regime.
67. The Commission continued to take advantage of global, regional and subregional conferences and other gatherings to enhance understanding of the Treaty and to advance its entry into force and the build-up of the verification regime. The Commission was represented at meetings of the Conference on Disarmament, the African Union, the IAEA, the North Atlantic Treaty Organization, the United Nations General Assembly and its First Committee, the World Economic Forum, and the Organisation for the Prohibition of Chemical Weapons (OPCW), among others. The Executive Secretary also participated in several conferences and seminars organized by leading think tanks.
68. The Executive Secretary held bilateral discussions with high level officials, including United Nations Secretary-General Ban Ki-moon and a number of foreign ministers, on the margins of the aforementioned events and during other seminars, workshops, briefings and visits. He also attended events related to nuclear non-proliferation and disarmament convened by individual governments.
69. Participation by the Executive Secretary in major events and high level bilateral talks constitutes a key element of PTS outreach efforts. These included the conference "Creating New Momentum for Nonproliferation and Disarmament in the Middle East/Gulf After the Failed NPT Review Conference (II)", organized by the Peace Research Institute Frankfurt (Berlin, Germany, May 2016); the Summer School on Nuclear Disarmament and Non-Proliferation (Mexico City, Mexico, July 2016); the "Foreign Policy Review Conference" (Windhoek, Namibia, July 2016); the sixth "Tokyo International Conference on African Development" (Nairobi, Kenya, August 2016); the international conference "Building a Nuclear-Weapon-Free World" (Astana, Kazakhstan, August 2016); the eleventh Strategic Forum, entitled "Safeguarding the

Future” (Lake Bled, Slovenia, September 2016); the international conference “Emerging Technologies and Global Security: An Agenda for the 21st Century” organized by the PIR Center and the Diplomatic Academy of the Russian Foreign Ministry (Moscow, Russian Federation, September 2016); the “Nuclear Policy Talks” forum (Washington, D.C., United States of America, November 2016); the event “Nuclear Explosion Monitoring: 60 Years of Science and Innovation”, organized by the United States Departments of State and Energy, (Washington, D.C., November 2016); the annual Wilton Park conference “Nuclear Non-Proliferation: Planning for 2020” (United Kingdom, December 2016), the “Munich Security Conference” (Munich, Germany, February 2017); the XXV Regular Session of the General Conference of the Agency for the Prohibition of Nuclear Weapons in Latin America (Mexico City, February 2017); the 15th World Congress on Public Health (Melbourne, Australia, April 2017); the twentieth anniversary of the Chemical Weapons Convention and the OPCW (The Hague, April 2017) and the Preparatory Committee for the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (Vienna, May 2017).

70. The PTS has continued to promote preparations for national implementation of the CTBT through its programme of legislative assistance to States on the measures to be taken in accordance with Article III of the CTBT. Model legislation and commentary have been widely distributed by the PTS and are available on the CTBTO public web site.
71. A significant portion of the outreach activities of the Commission is carried out using voluntary contributions provided by States Signatories. Among the activities conducted by the PTS on the basis of such contributions was the project facilitating the participation of experts from developing countries in technical meetings of the Commission and the release of an improved version of the ‘NDC in a box’, which is a software package enabling better integration of IMS data and national data of NDCs, thus enhancing the processing capabilities of States Signatories. Voluntary contributions have also been provided to build capacity in developing countries and to enhance understanding of the work of the Commission with a particular focus on the young generation, applications and development of the CTBT verification technologies and the benefits accruing from membership of the Commission, including the potential benefits derived from the civil and scientific applications of the verification technologies.
72. The PTS has continued to promote the Treaty and its verification regime through interaction with States, media, civil society, educational and scientific institutions, think tanks and the general public. Using a proactive and targeted approach, public information activities generated considerable media coverage for key events such as the 20th anniversary of the Treaty and the 2017 Science and Technology conference. Film, photography, interactive features and animations are notable characteristics of CTBTO outreach activities. The public web site and social media platforms have been further developed to reach new audiences, including the young generation, in particular in the remaining Annex 2 States. This has led to increased visibility for the Treaty and its verification regime in print, online and broadcast media worldwide. Media outreach and other public information activities have continued in the form of articles, op-eds, interviews, briefings, publications, special events, exhibitions and presentations.

## **CIVIL AND SCIENTIFIC BENEFITS OF THE TREATY**

73. There is a range of civil and scientific applications for the verification technologies of the Treaty that can benefit States Signatories. The abundance of data and products available to States Signatories can facilitate their civil and scientific activities, including, for example, natural disaster warning and preparedness, sustainable development, climate change research, knowledge expansion and human welfare. Since 2011 a total of 90 contracts have been signed, providing researchers from 23 countries free access to IMS data through the virtual Data Exploitation Centre.
74. As an example of the civil and scientific applications of the verification technologies, the Commission has agreed on terms under which IMS seismic and hydroacoustic data can be made available to recognized tsunami warning organizations. Fifteen such agreements or arrangements are currently in place for which data from 101 IMS stations are being sent. Tsunami warning organizations have confirmed that the use of IMS data, which are more timely and reliable than data from other sources, increases their ability to identify potentially tsunamigenic earthquakes and to issue more rapid warnings. Another example is the membership of the Commission in the Inter-Agency Committee on Radiological and Nuclear Emergencies which has 16 member organizations as well as observer organizations. The Commission is a co-sponsor of the Joint Radiation Emergency Management Plan of the international organizations. According to the plan, in case of a radiological or nuclear emergency IMS data and IDC products may be shared through the secure IAEA Unified System for Information Exchange in Incidents and Emergencies. An agreement for cooperation between the Commission and the IAEA in this regard was signed in 2016.

## **CONCLUSION**

75. Since the 2015 Article XIV conference, considerable progress has been achieved in the promotion of the Treaty and the advancement of its verification regime. The call for early entry into force has continued to feature prominently in the agenda of the international campaign for nuclear non-proliferation and disarmament. The verification regime of the Treaty has moved closer to completion, further improving its operational readiness and thereby increasing the confidence in its capability to detect any nuclear explosion test in any environment.