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**Conference on Facilitating the Entry into Force
of the Comprehensive Nuclear-Test-Ban Treaty**
New York, 23 September 2011

**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, 2011)**

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 much desired goal of entry into force and universalization of the Treaty. To date, the Treaty has been signed by 182 States with 154 States having ratified, including 35 of the 44 States listed in Annex 2. Saint Vincent and the Grenadines ratified the Treaty in September 2009, which was announced at the sixth Conference on Facilitating the Entry into Force of the CTBT convened under Article XIV of the Treaty (hereinafter referred to as the “2009 Article

* Reissued for technical reasons.

XIV conference’). The Marshall Islands ratified the CTBT in October 2009. The Treaty moved closer to universalization in 2010 with ratification by the Central African Republic and Trinidad and Tobago during the last week of the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), held from 3 to 28 May 2010 in New York. In June 2011, Ghana ratified the CTBT.

4. In addition to reaffirming the vital importance of the entry into force of the Treaty as a core element of the international nuclear disarmament and non-proliferation regime, the 2010 NPT Review Conference welcomed expressions by remaining Annex 2 States of their intention to pursue and complete the ratification process, including Indonesia and the United States of America. Furthermore, the conference welcomed the expressions by Guatemala, Iraq, Papua New Guinea and Thailand of their intentions to ratify the Treaty. Since then a number of other countries have made steady progress towards completion of their ratification processes.
5. Over seventy States attended the fifth Ministerial Meeting, held on 23 September 2010 in New York, to promote the entry into force of the Treaty, of which 24 were represented at the ministerial level. The Treaty promises to remain, as it has always been, a uniting force in the multilateral system, and the events described above clearly demonstrated that the Treaty continues to be a rallying point for nuclear non-proliferation and disarmament.

PREPARATORY COMMISSION

6. 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 for the Organization was established by States Signatories on 19 November 1996. The purpose of the Commission 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 131 States are accredited to the Commission and 136 have designated their National Authorities or focal points.
7. 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.

2009 ARTICLE XIV CONFERENCE

8. 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.

9. The 2009 Article XIV conference¹ was held on 24-25 September 2009 in New York with 103 ratifying States and States Signatories participating, as well as 3 observer States. This conference adopted a Final Declaration calling upon all States which had not yet done so to sign and/or ratify the Treaty (document CTBT-Art.XIV/2009/6, Annex). The declaration includes a number of measures to promote the entry into force of the CTBT.
10. In the course of the follow-up to the 2009 Article XIV conference, and in accordance with paragraph 11(c) of the Final Declaration, France and Morocco, which served as the Presidency of the conference, were selected as coordinators of the process “to promote cooperation, through informal consultations with all interested countries, aimed at promoting further signatures and ratifications”. On 29 June and 7 July 2011, at informal consultations within the framework of this ‘Article XIV process’, Mexico and Sweden were appointed to serve as Presidents-designate in preparing for the 2011 Article XIV conference in New York.

VERIFICATION REGIME

11. 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 known as 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

12. The IMS is to consist of a network of 321 monitoring stations, complemented by 40 noble gas detection systems, and 16 radionuclide laboratories. After entry into force of the CTBT, these facilities will produce data to detect possible nuclear explosions that are to be provided to States Parties for verification of compliance with the Treaty.
13. The momentum to complete the IMS network continues to be maintained at a steady pace. Significant progress has been made since mid-2009 in all four technologies – seismic, hydroacoustic, infrasound and radionuclide. As of 30 June 2011, 276 (86%) IMS stations had been installed. A total of 254 (79%) stations and 10 (63%) radionuclide laboratories had been officially certified as meeting the specifications of the Commission. The number of stations has increased by 17 since mid-2009. Given their remote location and complexities, these stations represent substantial achievements for the Commission. Major parts of the primary seismic network, the auxiliary seismic network, the infrasound network and the radionuclide network have already been certified and the network of hydroacoustic stations is virtually complete, with 10 of the 11 envisaged stations now certified. Finally, since the event announced by the Democratic People’s Republic of Korea in May 2009, which demonstrated the importance of noble gas monitoring, greater emphasis has been placed on this

¹ Previous Article XIV conferences were held in Vienna (in 1999, 2003 and 2007) and in New York (in 2001 and 2005).

technology. The installation of noble gas detection systems, the smooth transition of these systems into IDC operation and the first three certifications of such systems are important achievements. As of 30 June 2011, of the 40 systems envisaged by the Treaty, 27 had been installed. All these gains are not just about increases in data and information. They are about network resilience, progress in network coverage, greater diversity of recording systems and higher quality review.

14. In addition, political support was received from several countries hosting IMS facilities where the PTS could not proceed in previous years, bringing the prospect of a complete IMS network closer.

International Data Centre

15. The mission of the IDC is to support the verification responsibilities of States by providing products and services necessary for effective global monitoring after the entry into force of the Treaty.
16. The IDC continues in its provisional mode of operation and supports State 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. Over four terabytes of data and products were distributed in the past year. States were supported through an online help desk, data retrieval services, training courses, workshops, software and equipment.
17. During 2010, the IDC began to routinely process infrasound data and to incorporate the results into the automatic and reviewed products. Infrasound signals are important for detecting and locating an atmospheric explosion and, together with input from radionuclide monitoring, can be used to detect a nuclear test. However, infrasound propagation in the atmosphere is complex and highly variable, both seasonally and geographically.
18. The IDC continues to research ways to improve the techniques to fully utilize infrasound data. This effort includes calibration experiments using large explosions of known yield, such as that carried out in January 2011. These experiments require the collaboration of a number of States and provide additional opportunities for training in the technology.
19. Following the certification of the first noble gas detection system in 2010, this important technology was integrated into IDC operations. Noble gas data are now being routinely analysed and the results distributed to States Signatories.
20. At the end of 2010, there were 223 links in operation in the GCI. These were monitored using the state of health system of the IDC.
21. In the last two years, the IDC successfully upgraded the satellite capacity for the GCI in three of its six satellite regions. It also upgraded the capacity of the terrestrial part of the GCI. These upgrades will allow for future growth in station data and for increased

demand for data to be forwarded from the IDC to National Data Centres (NDCs) via the GCI.

Sustaining and Maintaining the IMS

22. 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 an intricate 'system of systems' that works towards meeting the verification requirements of the Treaty and ensuring minimal downtime of IMS facilities.
23. Operational experience with the systems 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. As the construction of the IMS advances, the importance of reviewing and improving operation and support of the facilities is amplified.
24. Over the last two years, the PTS 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 also continued to recapitalize IMS facility components reaching the end of their lifetime and to address unscheduled maintenance in a timely fashion. Furthermore, owing to the central role played by the station operator 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 and include hands-on training. Monitoring software has also been developed to facilitate the tasks of monitoring and detecting incidents and problems in the IMS network.
25. Operation and maintenance of IMS auxiliary seismic stations are the responsibility of the host States. Challenges related to sustainment of these stations have been more systematically addressed jointly with the host countries and other organizations over the last two years. Efforts have resulted in an increase in data availability of the certified auxiliary seismic stations and a better understanding of roles and responsibilities for sustaining them.
26. 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. The development of mechanisms such as timely customs clearance and tax exemption for equipment brought into an IMS host State by the Commission is also becoming increasingly relevant. Since September 2009, two facility agreements have been concluded by the Commission, bringing the total number of such agreements concluded with host States to 40, 33 of which are in force. There are active discussions with several of the 49 remaining States.

27. The PTS has increased its focus since mid-2009 on engineering and development activities. It continues to develop and implement cost effective solutions to address engineering problems arising at certified IMS stations. Greater attention has also been accorded to engineering initiatives with the aim of enhancing IMS monitoring facilities and improving the performance and capabilities of associated technologies.
28. Furthermore, progress has been made with the quality assurance/quality control programme to monitor the performance of the IMS network, i.e. to ensure that data produced are of acceptable quality.
29. As the IMS network grows, the costs associated with ageing and sustainment also rise. Provisions are in place to address peaks in obsolescence of IMS equipment in the foreseeable future. However, workable solutions need to be identified by the Commission in the case of repairs at IMS facilities following damage caused by natural forces. In 2010, extrabudgetary funding was successfully secured to accommodate a multimillion dollar reconstruction at two IMS stations in the Juan Fernández Islands (Chile), demonstrating once more the international support for the Treaty.
30. The establishment of an IMS technology development programme has continued to ensure that the IMS remains scientifically and technologically relevant and to provide the appropriate engineering solutions for IMS stations. The programme relies on a strong interaction with the science and technology community through the organization of annual technology meetings. It includes, in addition, studies and experiments at test facilities, such as the infrasound and test facility which opened in 2010 at the Conrad Observatory near Vienna. The PTS has also engaged in a technology foresight exercise to develop a long term vision of the developments and issues that will shape our next generation technologies and systems.
31. Finally, continued improvements of PTS computer systems have been implemented since mid-2009 with the aim of eliminating temporary downtime of service in operation and accelerating the data backup process.
32. The PTS sustainment strategy and the joint efforts with delegations, national governments, station operators and national institutions have been rewarded. There has been a continuous improvement over the last three years in raw data availability from IMS stations, which reached 91% in the first half of 2011. Such a sustained improvement is all the more remarkable when measured against the continuous and rapid growth of the whole system.
33. Post-certification activity (PCA) contracts, agreements and arrangements play a key role in supporting the ability of station operators to operate and maintain primary IMS stations after certification. These contracts, agreements and arrangements ensure that the costs associated with regular activities at the stations will be covered by the PTS in accordance with the Treaty. The PTS continued to standardize the services provided under PCA contracts, taking into consideration sustainment costs for the entire lifetime of a facility.

On-Site Inspections

34. 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.
35. The Commission has continued to build up the OSI verification regime in accordance with Treaty requirements. Considerable progress has been made in the last two years. Upon conclusion of the 2008 Integrated Field Exercise (IFE) in Kazakhstan, a comprehensive review of the exercise, including identification of lessons learned, was carried out and completed by mid-2009, resulting in the adoption of an OSI action plan.
36. Thirty-eight distinct action plan projects are to be carried out by the end of 2013, which will contribute to achieving the readiness of the OSI regime at entry into force of the Treaty. These projects relate, inter alia, to the areas of operations, operations support and logistics, equipment development, documentation and training.
37. Inspection techniques, such as ground based visual observation, and cross-cutting aspects pertaining to inspection team communications, search logic and functionality have been developed further. Additionally, work on OSI techniques yet to be developed (e.g. multispectral and infrared imaging and active seismic surveys) has been initiated.
38. Major efforts have been dedicated to noble gas detection system for OSI purposes. Beside the development of a draft concept of operations for noble gas sampling, work has concentrated on the further development of argon-37 and radioxenon analysis equipment. Additionally, the Seismic Aftershock Monitoring System has been optimized and work on the development of a concept of operations for continuation period techniques has been carried out.
39. Considerable headway has been made in the development of an Integrated Inspection Support System. This includes such projects as the establishment of an OSI databank, development of a rapid deployment system and improvement of the OSI health and safety regime. In addition, an Equipment Storage and Maintenance Facility (ESMF) has been established, which can be considered as a combined purpose facility to support training, tests and exercises together with the original concept of storage, maintenance and calibration of OSI equipment. Furthermore, the ESMF is to house a prototype of the OSI Operations Support Centre.
40. Training work focused on the development and implementation of the second training cycle for surrogate inspectors. The aim of this cycle is to add another 50 trained experts from States Signatories to the roster of surrogate inspectors. Beside a number of tabletop exercises, an introductory and an advanced course were carried out in 2010 and 2011 respectively with the participation of 55 experts from 43 States Signatories.
41. Progress has been made in standardizing, revising and further developing OSI subsidiary documents, including standard operating procedures and work instructions,

and in further updating the OSI document management system with new subsidiary documents and revised templates. A new draft equipment list for initial period techniques has been produced on the basis of technical advances and development work. Another priority task of the Commission remains the elaboration of the draft OSI Operational Manual. The product of the third round of elaboration is intended to be a draft manual that can be tested by the PTS during the next IFE, which is planned for 2014. Planning activities for the next IFE have been initiated with the development of an overall exercise concept and preparatory work for the selection of a host country.

FUKUSHIMA NUCLEAR POWER PLANT ACCIDENT

42. On 11 March 2011, Japan was hit by a powerful earthquake with a magnitude of 9.0. At the time of the Tohoku earthquake, data and data products from about twenty IMS seismic and hydroacoustic stations were being sent in real time to seven warning centres in the Pacific area, including Japan and the USA (Hawaii).
43. In addition, the PTS provided the States Signatories and relevant international organizations with data and data products to help monitor and assess the situation, and to prepare possible contingency plans to respond to nuclear emissions following the accident at the Fukushima nuclear power plant caused by the tsunami. The organizations included the IAEA, the World Meteorological Organization, the United Nations Development Programme, the World Health Organization and the United Nations Office for Disarmament Affairs.
44. An unintended consequence of the Fukushima nuclear disaster was that it created the circumstances for a '360 degree' systems performance stress test of all monitoring components of the IMS. The result was impressive. The system displayed a high level of operational readiness and proved its ability to detect effectively seismic activity and radionuclide particulate and noble gas releases. It also showed that the data processing and data products of the IDC can enable States Signatories to determine in real time the nature of an event.
45. In addition to the six technical briefings provided by the PTS to inform States Signatories and observers of findings and predictions, the data and data products, including those derived using atmospheric transport modelling, helped users monitor the dispersion of radionuclide particulates and noble gases from the Fukushima plant and prepare for any necessary contingency planning. The demonstrated strengths and the unique capabilities of the CTBT verification regime served to contribute to regional and global efforts to assess the radionuclide risks for human health and the environment in the case of a nuclear accident.

SCIENCE AND TECHNOLOGY CONFERENCE

46. The CTBT: Science and Technology 2011 Conference (S&T2011), which was held in Vienna from 8 to 10 June 2011, brought together 600 scientists and diplomats from 104 countries. Following two previous conferences, held in 2006 and 2009, the purpose was to develop further cooperation between the scientific community and the Commission. The conference provided scientists and scientific institutions with an exceptional opportunity to discuss advances in science and technology relevant to

nuclear test ban verification, and to explore civil and scientific applications of the CTBT verification infrastructure. It also fostered partnerships and knowledge exchange between the Commission and the broader scientific community.

47. The conference showcased over 270 oral and poster presentations by scientists worldwide, including from some non-signatory States. The presentations were organized around five themes: the earth as a complex system; understanding the nuclear explosion source; advances in sensors, networks and observational technologies; advances in computing, processing and visualization for verification applications; and creating knowledge through partnerships, training and information/communication technology. A special session on the Tohoku earthquake and the Fukushima accident was organized and included a panel discussion. Two additional panel discussions were centred on the practical means to achieve cooperation with the scientific community.
48. The CTBT verification regime is highly dependent on science and technology. Therefore S&T2011 discussed various mechanisms to continuously engage with the scientific community and ensure that the verification regime will stay attuned to scientific and technological progress.

TRAINING AND TECHNICAL CAPACITY BUILDING

49. The Commission accords high importance to training and capacity building in order 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).
50. In addition to traditional training methodologies, new information and communication technologies such as e-learning offer broader possibilities to expand and further enhance capacity building in the future. Training and capacity building are provided to States Signatories that have access to IMS data and IDC products (more than 1200 authorized users from 117 States) as well as to those that do not have access (68 States) and those that do have access but make limited use of the information.
51. As part of a new strategy, which covers the provision of training, expert assistance and basic equipment for NDCs, since 2009 more than 240 NDC technical staff from 75 States Signatories have been trained. This effort has been expanded with the introduction of an e-learning system. This enhanced delivery tool has made it possible for the Commission to provide necessary training more efficiently and effectively to targeted audiences, namely IMS station operators, NDC technical staff, OSI field inspectors, officials, diplomats and PTS staff. Currently, 30 e-learning modules, 11 of which are in all of the official working languages of the United Nations, are available to these target audiences. This is in addition to the annual OSI introductory course organized for staff of Permanent Missions in Vienna, in which around thirty persons participate every year.
52. A new strategy for training station operators has been developed and is being implemented on the basis of experience gained and lessons learned from providing such training since 1997 (more than one thousand station operators from 240 stations have

been trained), The new strategy takes into consideration the tasks to be performed by the station operators, as described in the latest draft IMS Operational Manuals. In this regard, the e-learning tool is instrumental in providing basic theoretical training information. It also allows classroom training organized by the Commission to be more practical. Since 2009, more than 170 station operators from 54 States Signatories have been trained.

53. The 2011 Operation and Maintenance Workshop (May 2011, San Diego, California, USA) was the first workshop of its kind to be organized jointly by the Commission and a State Signatory. The meeting brought together over ninety experts, station operators and equipment providers from 43 countries, some of which were participating in such a workshop for the first time. It aimed at improving synergies and optimizing the support for certified IMS facilities. The workshop concentrated on increasing and improving the level of awareness, understanding and communication with respect to roles and responsibilities for operation and maintenance of IMS facilities.

Capacity Development Initiative

54. The need to invest in the next generation of nuclear non-proliferation and disarmament specialists is a key driver of the Commission's capacity development initiative, launched in 2010. By increasing the awareness and understanding of the international non-proliferation and disarmament framework, this initiative aims at building capacities in areas related to the Treaty. To achieve this objective, the PTS developed an online distance learning platform 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.
55. As part of the overall capacity development, the PTS is organizing a week-long introductory course, entitled "Strengthening Verification, Enhancing Security: The Science and Political Significance of the CTBT", in September 2011 in Vienna. This course is expected to be attended by participants from Permanent Missions in Vienna, university students and professors, as well as the participants in the United Nations Disarmament Fellowship Programme. The course is planned to be broadcast live online to many other participants. As a follow-up, an advanced technical course is scheduled to be held in October 2011, which will examine in depth the scientific and technical aspects of the verification regime.
56. To broaden the scope of the initiative, the Commission is expanding on an existing network of global partnerships, including States, disarmament and non-proliferation organizations and arrangements, universities, research institutes, non-governmental organizations, corporations and individuals with expertise and interest in verification science and technology. By forming these partnerships, the Commission is actively enhancing awareness and understanding of the Treaty, as well as increasing the number of States involved in the implementation of the Treaty and enjoying the benefits of its verification system.

EVALUATION

57. As the verification system moves ever closer to completion, processes and systems are reaching maturity. However, this does not imply a halt to progress in system development. The PTS undertakes to continuously enhance effectiveness and efficiency through its Quality Management System (QMS). 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 customers, 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.
58. In recent years, 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 step in 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.
59. The PTS has continued to develop its QMS. The main cornerstones of the QMS are to ensure continuous improvement of the performance of the verification regime and to respond effectively to the needs of States Signatories.
60. At the core of the QMS are the PTS Process Metrics Manual and the prototype Web based platform displaying information on the performance of the verification system (PRTool). This platform includes most performance parameters, so-called key performance indicators (KPIs), as well as their trends. The KPIs can be investigated by process and product. They can also be retrieved by date, by geographical region, or for an individual country or a specific IMS station. This approach enables assessment of the performance of the CTBT verification system at many levels. It sets high standards of transparency and accountability, and helps States Signatories monitor programme implementation by the PTS with the possibility of referring back to any given year and making a judgement on the value gained for the resources invested.

PROVISIONAL TECHNICAL SECRETARIAT

61. As of 30 June 2011, the PTS comprised 248 staff members from 73 countries. The number of staff in the Professional category was 159. The PTS is committed to a policy of equal employment opportunity, aiming in particular at improving the representation of women, especially in the Professional category. As of 30 June 2011, there were 47 women in Professional positions, corresponding to 29.56% of the Professional staff.
62. The approved Budget of the Commission for 2011 amounts to US\$117.5 million. From 1997 up to and including the financial year 2011, the total budgetary resources amounted to \$943.9 million and €339.8 million. In equivalent US dollars this corresponds to a total of \$1370.8 million calculated using the budgetary rate of exchange of €1:US\$0.796. Of this total, 79.5% has been dedicated to verification related programmes, including \$343.0 million (25.0%) for the Capital Investment Fund for the installation and upgrade of IMS stations.

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 2009. 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. Since September 2009, for example, international cooperation workshops have been held in Bangkok (November 2009), in Ulaanbaatar (March 2010) and in Rabat (October 2010). A 'scientist to scientist' workshop was held in Beijing in March 2011. In addition to promoting entry into force and universality of the Treaty, these workshops helped enhance State authorities' understanding of the Treaty and stressed the importance of national implementation measures. Similar objectives guided the information visits that were held in Vienna in June 2010, when Indonesian parliamentarians were able to learn more about the Treaty and the work of the Commission; and in June 2011, when representatives from nine developing States that have yet to ratify the Treaty – including two non-signatory States – were briefed about the political significance of the CTBT and the application of PTS data and products.
66. Participation by the Executive Secretary in major events and high level bilateral talks constitutes a key element of PTS outreach efforts. Since September 2009, such events have included the fifth Ministerial Meeting to promote the entry into force of the CTBT (New York, September 2010); the sixty-fifth session of the United Nations General Assembly (New York, September 2010); the First Committee of the United Nations General Assembly (New York, October 2009); the 2010 NPT Review Conference (New York, May 2010); the General Conference of the IAEA (Vienna, September 2010); the Annual NATO Conference on WMD Arms Control, Disarmament and Non-proliferation (Warsaw, December 2009); the 121st, 122nd and 123rd Assemblies of the Inter-Parliamentary Union (Geneva, October 2009; Bangkok, March-April 2010; Geneva, October 2010); the Fifth Plenary Session of the Parliamentary Assembly of the Mediterranean (Rabat, October 2010); the Global Zero Summit (Paris, February 2010); the Fourth United Nations Conference on the Least Developed Countries (Istanbul, May 2011); the 16th Ministerial Conference and Commemorative Meeting of the Non-

Aligned Movement (Bali, May 2011); and the 38th Session of the Council of Foreign Ministers of the Organization of Islamic Cooperation (Astana, June 2011).

67. The Executive Secretary held many bilateral discussions with high level officials, including several Foreign Ministers, on the margins of each of the aforementioned conferences and during several other seminars, workshops, briefings and visits. He also attended a number of events related to nuclear non-proliferation and disarmament convened by individual governments. With a view to strengthening bilateral interactions with the Commission and raising awareness about the Treaty, the Executive Secretary has visited 16 States since September 2009.
68. Throughout the reviewed period, the PTS continued promoting 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. The PTS model legislation and commentary have been widely distributed and are available on the public website of the Commission.
69. A significant portion of the outreach activities of the Commission is carried out using voluntary contributions provided by States Signatories, which amounted to over \$3 480 000 in 2010. Among the activities conducted by the PTS on the basis of such contributions were the project facilitating participation of experts from developing countries in technical meetings of the Commission and the aforementioned information visits in June 2010 and June 2011. Moreover, the PTS was able to assist in the organization of national seminars in a number of non-ratifying States, such as the scientific workshop that was conducted in Beijing in March 2011. Voluntary contributions have also been provided to build capacity in developing countries and to enhance States' understanding of the work of the Commission, applications of the verification technologies and the benefits accruing from membership of the Commission, including the civil and scientific advantages that it offers.
70. The PTS has continued to promote the Treaty and its verification regime through interaction with media, civil society, educational and scientific institutions, think tanks and the general public. Using a proactive and targeted approach, public information activities have covered all relevant events, such as the 2010 Ministerial Meeting, the March 2011 disaster in Japan and S&T2011. Audiovisual reports, interactive features and animations have become notable characteristics of outreach activities. Systematic use of social networking tools has also intensified, leading to much improved visibility for the Treaty and its verification regime in print and broadcast media worldwide and to many more visits to the public website (www.ctbto.org). Moreover, media outreach and other public information activities continued in the form of articles, interviews, electronic newsletters, press releases, briefings, publications such as the magazine *CTBTO Spectrum*, exhibitions and presentations.

CIVIL AND SCIENTIFIC BENEFITS OF THE TREATY

71. States Signatories benefit from the global verification regime built to monitor compliance with the CTBT. The IMS data and IDC products are available in near real time and are also archived. In addition, there is a range of civil and scientific applications for the verification technologies of the Treaty that can benefit States

Signatories. The real time data and products available to them can be used for hazard warning and mitigation. The archived data and products can be used in studies to gain a greater understanding of natural hazard risks, earth structure and tectonics, monitoring of environmental radiation, sustainable development, knowledge expansion and human welfare.

72. One example of the civil and scientific applications of the verification technologies are the tsunami agreements under which data from IMS seismic and hydroacoustic stations can be made available to recognized tsunami warning organizations. Nine such agreements are in place with Australia, France, Indonesia, Japan, the Philippines, Thailand, Turkey and the USA (Alaska and Hawaii), for which data from 45 IMS stations (primary seismic, auxiliary seismic and hydroacoustic) 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 potential tsunami generating earthquakes and to provide rapid warnings.

CONCLUSIONS

73. Since the 2009 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 topped the agenda of the international campaign for nuclear non-proliferation and disarmament.
74. The verification regime of the Treaty has inched closer to completion, further improving its operational readiness. Of significance is the introduction of infrasound and noble gas data into IDC operations. These developments have in turn increased the reliability of the system and the confidence in its capability to detect any nuclear explosion test in any environment.
75. The Commission has succeeded in reaching a high level of transparency and accountability. The States Signatories enjoy constant access to real time data, data products and information on its performance.
76. The Fukushima accident presented a serious stress test for the verification regime and the PTS. The organization has outperformed any expectations in this respect. It functioned in an integrated, effective and efficient manner and proved its high capabilities. The performance of the verification regime of the Treaty in response to this crisis has generated considerable interest in its civil and scientific potential, which was a key subject of discussion at S&T2011.