CTBTO
PREPARATORY COMMISSION

preparatory commission for the comprehensive nuclear-test-ban treaty organization

Annual Report 2007

CTBTO
PREPARATORY COMMISSION

preparatory commission for the comprehensive nuclear-test-ban treaty organization

Annual Report 2007

Published by the Provisional Technical Secretariat of the
Preparatory Commission for the
Comprehensive Nuclear-Test-Ban Treaty Organization
Vienna International Centre
P.O. Box 1200
1400 Vienna
Austria

Throughout the document, countries are referred to by the names that were in official use in the period for which the text was compiled.

The boundaries and presentation of material on maps contained in this document do not imply the expression of any opinion on the part of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization concerning the legal status of any country, territory, city or area or its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of names of specific companies or products (whether or not indicated as registered) does not imply any intention to infringe proprietary rights, nor should it be construed as an endorsement or recommendation on the part of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization.

Printed in Austria
June 2008

Based on document CTBT/PC-30/INF.2, Annual Report 2007

Message
from the Executive Secretary

In 2007, the CTBTO Preparatory Commission celebrated its 10th anniversary since it began preparations for the effective implementation of the Comprehensive Nuclear-Test-Ban Treaty (CTBT).

In those 10 years a great deal has been achieved. Concerted efforts by many dedicated people have led to the creation of a global network of monitoring stations, which continues to develop and grow. As a result, a comprehensive verification system spanning the earth and capable of detecting nuclear explosions underground, under water and in the atmosphere is nearing completion.

Political support for the Treaty continues to grow, as evidenced by the ever increasing number of countries that have signed up to its principles. As the Treaty approaches universality, a robust norm against testing has developed and is ready to be enshrined in international law upon entry into force.

For our part, we at the Provisional Technical Secretariat have striven over recent years to constantly develop and improve our own abilities and expertise with a view to enhancing the capabilities of the organization and, in turn, strengthening the international disarmament and non-proliferation effort.

International cooperation, dedicated training and improvements in science and technology have all played a key role. The importance of good governance through evaluation and oversight practices has remained at the forefront of planning and management. The dedicated efforts of States Signatories in guiding our efforts have been instrumental. Today the Preparatory Commission stands as "One Commission", working together towards a common goal.

I am especially pleased to note the significant progress made by the Commission in 2007 in furthering the objectives of the Treaty. It was, as you will see from this annual report, a busy year for all involved.

Those of you who are already familiar with the work of the Commission will notice a change this year to the style and structure of the annual report. This is in order to make the work of the organization more accessible and the annual reports more user friendly for a broader readership.

For those of you who have only recently discovered the CTBT and the work of the Commission, I hope that you find this report both useful and informative.

Tibor Tóth
Executive Secretary

CTBTO Preparatory Commission

Vienna, March 2008



Treaty

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) is an international treaty outlawing nuclear test explosions in all environments. In providing for a total ban on nuclear testing, the Treaty seeks to constrain the development and qualitative improvement of nuclear weapons and end the development of new types of nuclear weapon. In doing so, it constitutes an effective measure of nuclear disarmament and non-proliferation in all its aspects.

The Treaty was adopted by the United Nations General Assembly and opened for signature in New York on 24 September 1996. On that day, 71 States signed the Treaty. The first State to ratify the Treaty was Fiji on 10 October 1996.

Under the terms and provisions of the Treaty, the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) is to be established in Vienna, Austria. The mandate of this international organization is to achieve the object and purpose of the Treaty, to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for cooperation and consultation among States Parties.

Preparatory Commission

In advance of the entry into force of the Treaty and the establishment of the CTBTO proper, a Preparatory Commission for the organization was established by the United Nations on 19 November 1996. The Commission was given the mandate of preparing for entry into force and is located at the Vienna International Centre.

The Commission focuses its activities on two key areas. The first is establishment of a global verification regime to monitor compliance with the comprehensive ban on explosive nuclear testing. Such a regime must be capable of detecting nuclear explosions in all environments – underground, under water and in the atmosphere. The second key area is promotion of Treaty signature and ratification to achieve entry into force. The Treaty will enter into force 180 days after it has been ratified by all 44 States listed in its Annex 2.

The Commission consists of two organs: a plenary body responsible for directing policy and which is composed of all States Signatories; and a Provisional Technical Secretariat (PTS), which assists the Commission in its duties, both technically and substantively, and carries out such functions as the Commission determines. The PTS started work in Vienna on 17 March 1997 and is multinational in composition, with staff recruited from Member States on as wide a geographical basis as possible.

Signing of the Treaty at United Nations Headquarters on 24 September 1996.

Above (from left to right): the Vice Premier and Minister for Foreign Affairs of China, Qian Qichen, the President of the United States of America, Bill Clinton, and the Minister of Foreign Affairs of the Russian Federation, Yevgeny Primakov. Below (from left to right): the Minister for Foreign Affairs of Mexico, José Angel Gurría, the Minister of Foreign Affairs of South Africa, Alfred Nzo, and the Prime Minister of Japan, Ryutaro Hashimoto.



Summary

The Preparatory Commission invested considerable time and resources in promoting signature and ratification of the Treaty throughout 2007. As a result of extensive outreach efforts, four more countries ratified the Treaty, bringing the total number of signatures to 177 and the total number of ratifications to 141, including 34 of the 44 States listed in Annex 2 to the Treaty, whose ratification is required for it to enter into force. In September, a fifth Conference on Facilitating the Entry into Force of the CTBT was held in the Hofburg palace in Vienna. The conference adopted its Final Declaration by consensus – a rare commodity in today's nuclear disarmament and non-proliferation climate.

The International Monitoring System (IMS) also saw significant progress in the course of the year. Eleven monitoring stations and five noble gas systems were installed or upgraded in 2007. This meant that, by the end of the year, 249 stations and 16 noble gas systems had been established, representing 78% and 40% respectively of the total planned. Thirty monitoring stations and one radionuclide laboratory were certified as fully operational in 2007, bringing the total number of certified stations to 214 (67% of the entire network) and the total number of certified radionuclide laboratories to ten (63% of the total). This included the Wake Island station in the middle of the Pacific Ocean, a certification milestone that leaves only one station in the hydroacoustic network to be completed.

The Provisional Technical Secretariat (PTS) set into motion several sustainment initiatives to define, develop, implement and continuously improve the life cycle support given to the IMS. One example was the creation of a section in the PTS specifically to handle support issues. In 2007, it saw the first full year of operation, strengthening the support and logistical aspects of IMS sustainment.

Work began on the transfer of the global network of communication terminals to a new technology platform – effectively the creation of a new Global Communications Infrastructure (GCI) – with 57 terminals transferred over the 12 month period. The terminals provide communication links between the International Data Centre (IDC) in Vienna and IMS sites around the world, as well as National Data Centres and station operators. Utilizing a commercial satellite constellation of 66 satellites, connectivity with the South Pole station doubled, meaning that this polar region is now under 24 hour coverage.

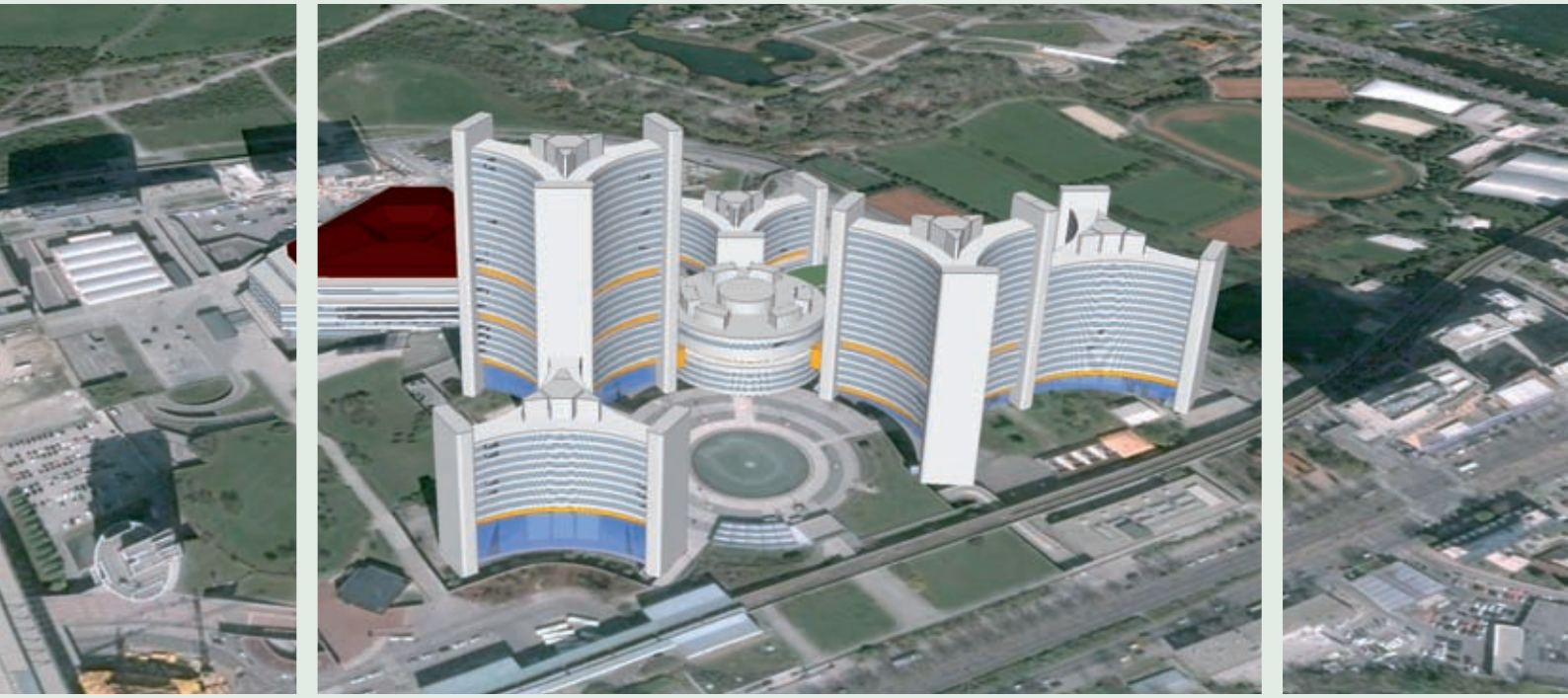
The new state of the art Operations Centre at the IDC saw its first full year of operations in 2007. Thirty-one IMS stations were introduced into IDC operations, increasing the total number of stations in operations to 219. Analysed data produced by the IDC in the form of bulletin products continued to be enhanced, with the introduction of infrasound data to the Reviewed Event Bulletins. In June, distribution to interested States Signatories of raw data from the first 14 stations to have noble gas systems installed began, and in October, distribution of automatic analysis results began for testing purposes.

By the end of 2007, 97 secure signatory accounts – one for each requesting State Signatory – had been created and a total of 859 users from these States Signatories had been authorized to access

IMS data and IDC products and receive technical support. This is an increase of more than 50 over the number of users in 2006. More than 1000 requests from authorized users regarding technical information were received and resolved during the year.

In December, a focused exercise based on a recorded seismic event in Turkey was successfully conducted by the PTS and the World Meteorological Organization (WMO). The exercise involved a hypothetical radionuclide release in order to test and evaluate atmospheric transport modelling software developed in-house by the PTS. The joint venture served as a prime example of how the harmonization of efforts by the PTS and WMO in this area is serving to benefit both organizations and their members.

Tsunami warning centres continued receiving data from the IDC throughout 2007, with 30 monitoring stations providing data to four such centres in or around the Pacific Ocean and South China Sea. While the purpose of the verification regime is to verify



the CTBT, tsunami warning is just one example of the potential civil and scientific applications for data that the organization produces.

In June, a special exercise was conducted in the Chernobyl Exclusion Zone in Ukraine, as part of ongoing preparations for on-site inspection readiness. This exercise was evaluated and lessons learned were fed into the preparation and design of a larger, more complete field exercise, to take place in Kazakhstan in 2008. Training programmes and equipment testing were also an integral element of progress made on this front during the year.

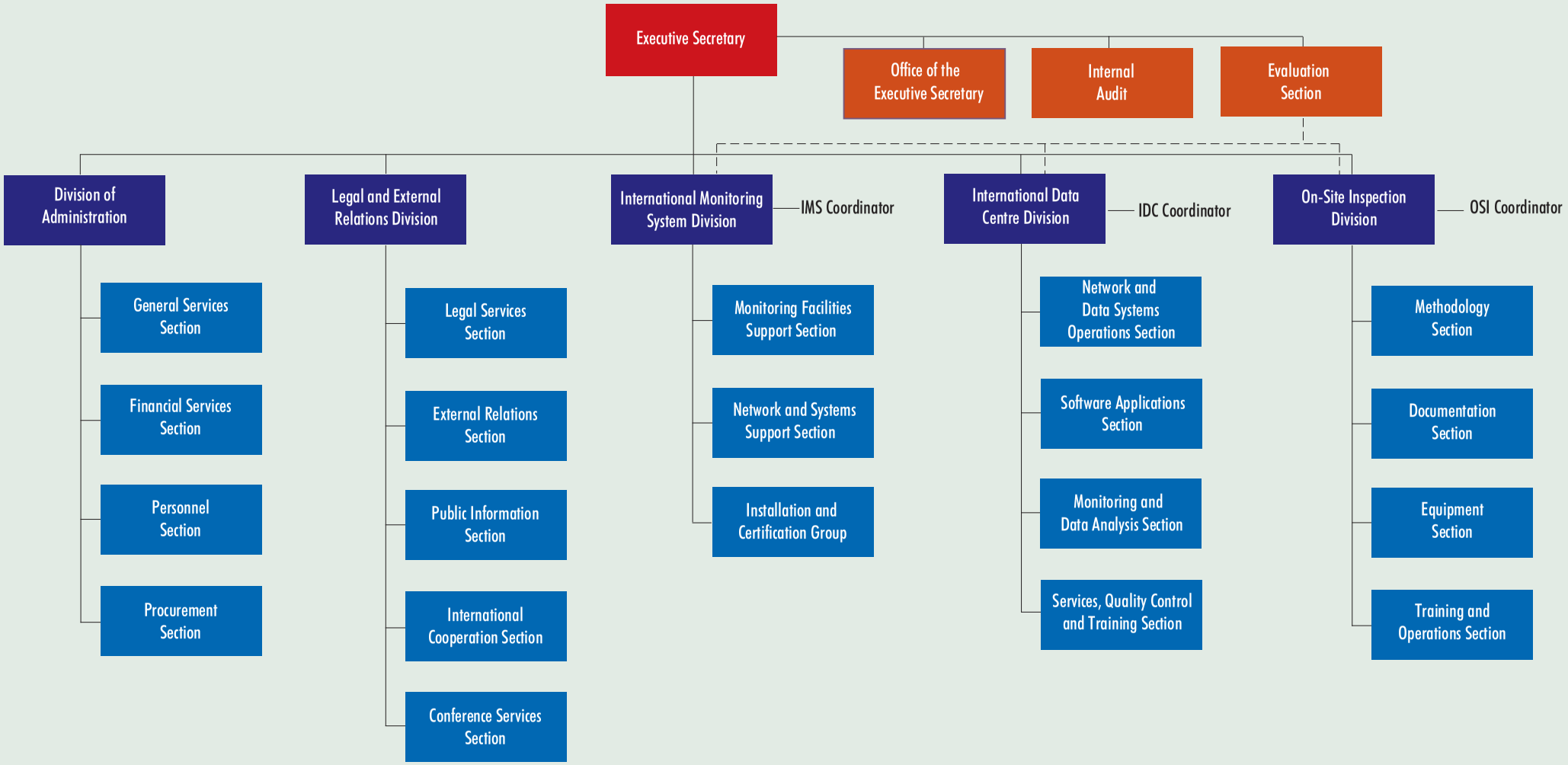
Capacity building through workshops and training courses continued in 2007. Workshops and courses were conducted for station operators, analysts and inspectors in Austria, Brazil, France, Hungary, Japan, Sweden, Ukraine and the United States of America. These dedicated training activities served to strengthen the technical capabilities and expertise of States Signatories as well as those of the Commission. The procurement of a new e-learning management system towards the end of the year significantly enhanced the potential learning opportunities available to States Signatories and PTS staff as the organization moves forward into 2008 and beyond.

Evaluation and oversight of the organization's activities continued through the implementation of the Quality Management System. Key performance indicators were identified to measure progress made in those activities related to development of the verification system. A preliminary draft Process Metrics Manual, compiling the key performance indicators corresponding to PTS products and processes, and the methods to compute them, was issued and discussed during a Quality Management Workshop held in Vienna in May.

A pilot project to facilitate participation of experts from developing countries in official technical meetings of the Commission was successfully initiated at the beginning of the year. Voluntary contributions were made by Finland, Indonesia, Malaysia, Morocco, the Netherlands, New Zealand, Norway and South Africa. The project will continue in 2008, enhancing further the capacities of the organization and its technical expertise.

In 2004, a report reviewing the organizational structure of the PTS led to the formulation of a 'road map' to guide implementation of a restructuring process. The year 2007 witnessed provisional completion of this process, with the last step due to take place in the first quarter of 2008. This new structure has already delivered benefits for the organization, such as promoting efficiencies and optimizing investments already made. In line with the trend of previous years, the PTS continued and will continue to achieve more with the same level of resources.

Organizational Structure of the Provisional Technical Secretariat
(31 December 2007)



Contents

Abbreviations

CIF	Capital Investment Fund
GCI	Global Communications Infrastructure
IDC	International Data Centre
IFE	Integrated Field Exercise
IMS	International Monitoring System
IPU	Inter-Parliamentary Union
KPI	key performance indicator
NDC	National Data Centre
NGO	non-governmental organization
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
OPCW	Organisation for the Prohibition of Chemical Weapons
OSI	on-site inspection
QMS	Quality Management System
PCA	post-certification activity
PMO	Policy Making Organ
PTS	Provisional Technical Secretariat
REB	Reviewed Event Bulletin
SEL	Standard Event List
SLSD	Standard List of Signal Detections
UNEG	United Nations Evaluation Group
VPN	virtual private network
VSAT	very small aperture terminal
WMO	World Meteorological Organization

International Monitoring System

The International Monitoring System (IMS) is a global network of sensors for detecting and providing evidence of possible nuclear explosions. Upon completion, the IMS will consist of 321 monitoring stations and 16 radionuclide laboratories throughout the world in locations designated by the Treaty. Many of these facilities are located in areas that are remote and difficult to access, posing major engineering and logistical challenges.

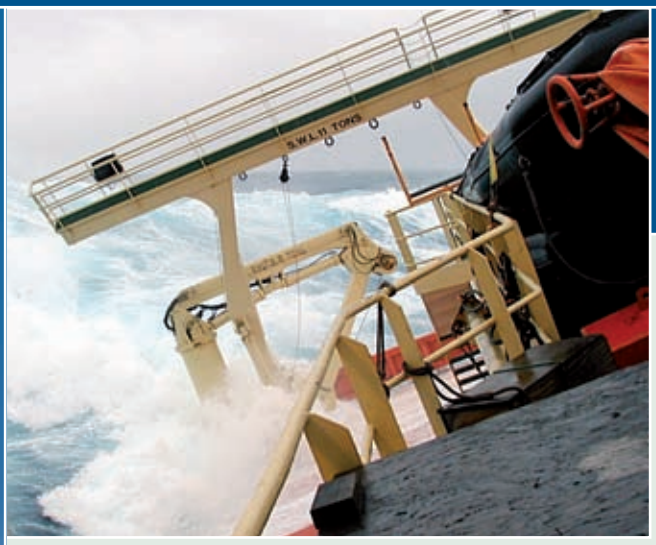
The IMS uses seismic, hydroacoustic and infrasound monitoring technologies to detect the energy released from an explosion or a naturally occurring event in the underground, underwater and atmospheric environments.

Radionuclide monitoring is also an integral part of the IMS. This advanced monitoring technology uses air samplers to collect particulate matter from the atmosphere. Samples are then analysed for evidence of physical products created by a nuclear explosion and carried through the atmosphere. The analysis of the radionuclide content can confirm whether an event recorded by the other monitoring technologies was actually a nuclear explosion.

To enhance the radionuclide monitoring, systems for detecting radioactive forms of noble gases such as argon and xenon are being installed at stations in the radionuclide network and are being integrated into routine operations. The addition of such systems will strengthen the capacity of the IMS and continue the cutting-edge approach to the creation of the verification system.

HIGHLIGHTS IN 2007

- Certification of 30 stations and one radionuclide laboratory
- Certification of station HA11, located in the Pacific Ocean, bringing the hydroacoustic monitoring network to near completion
- Completed installation or upgrading of 11 stations and completed installation of five noble gas systems
- Further strengthening and streamlining of the logistical and support processes of the IMS sustainment structure
- Introduction of an automatic system to request the annual station summary report from primary seismic, hydroacoustic and infrasound stations.



Auxiliary seismic station AS102, Davos, Switzerland.

ESTABLISHMENT, INSTALLATION AND CERTIFICATION

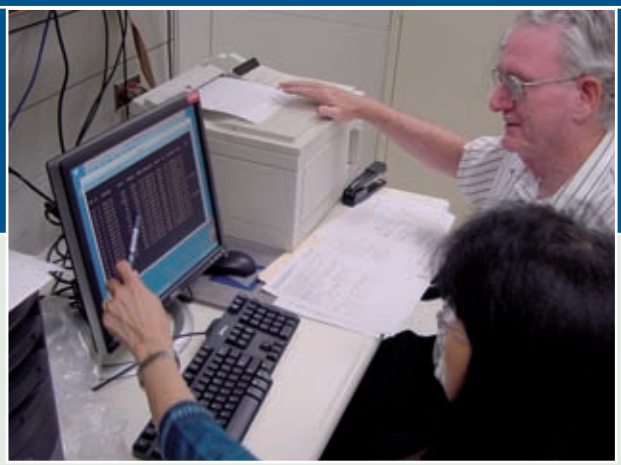
Establishment of a station is a general term referring to the building of a station from its initial stages until its completion. *Installation* typically refers to all work performed until the station is ready to send data to the International Data Centre (IDC). This includes, for instance, site preparation, construction (civil works) and equipment installation. A station receives *certification* when it meets all technical specifications, including requirements for data authentication and transmission through the Global Communications Infrastructure (GCI) link to the IDC in Vienna. At this point the station is considered an operational unit of the IMS.

ESTABLISHING THE INTERNATIONAL MONITORING SYSTEM

In 2007, significant progress was made towards the completion of the IMS, with the continued build-up of the system in all four technologies (seismic, hydroacoustic, infrasound and radionuclide). Eleven stations and five noble gas systems were installed or upgraded in total. Thus, by the end of 2007, 249 IMS stations were established, representing 78% of the entire network. Sixteen noble gas systems were also established, representing 40% of the total planned.

During the year, 30 stations and one radionuclide laboratory were certified, bringing the total number of certified stations to 214 (67% of the entire network) and the total number of certified radionuclide laboratories to ten (63% of the total).

Primary seismic station PS25, Songino, Mongolia.



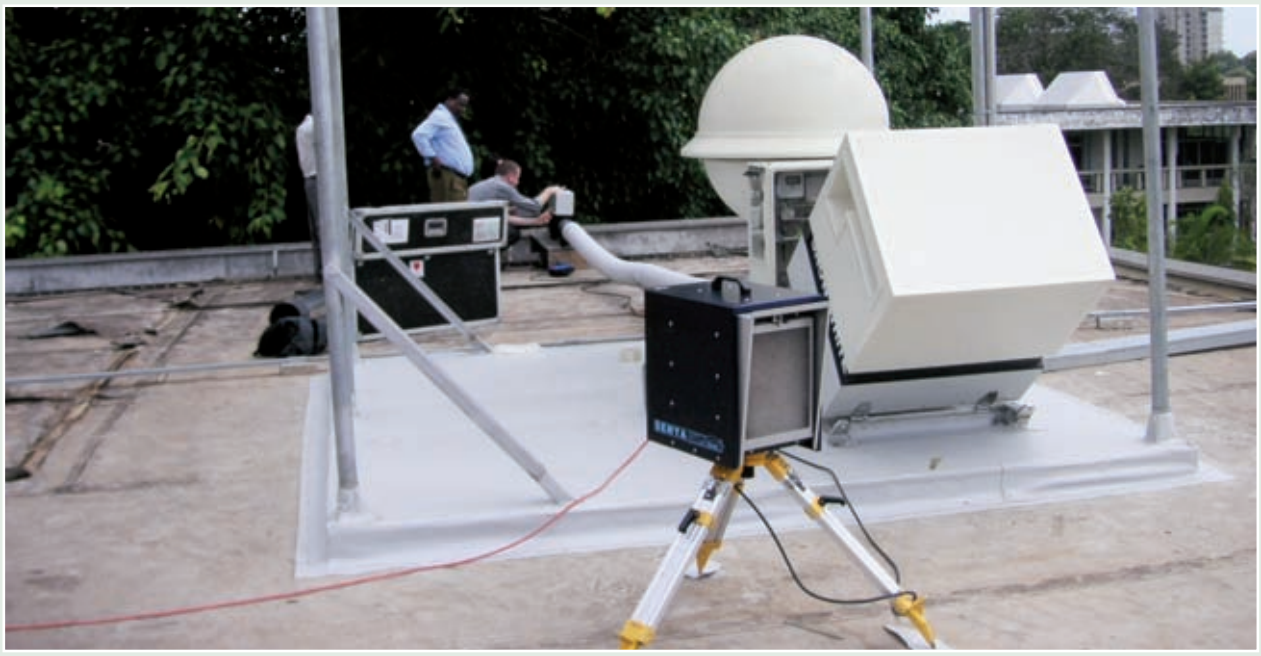
PTS staff member checking analytical procedures together with a staff member of radionuclide laboratory RL16, the Pacific Northwest National Laboratory, Richland, WA, USA.

Table 1. Status of the Station Installation Programme (31 December 2007)

IMS Station Type	Installation Complete		Under Construction	Contract Under Negotiation	Not Started
	Certified	Not Certified			
Primary seismic	37	5	3	1	4
Auxiliary seismic	78	21	8	2	11
Hydroacoustic	10	1	0	0	0
Infrasound	39	0	7	2	12
Radionuclide	50	8	8	4	10
Total	**214**	**35**	**26**	**9**	**37**

Table 2. Status of Radionuclide Laboratory Certifications (31 December 2007)

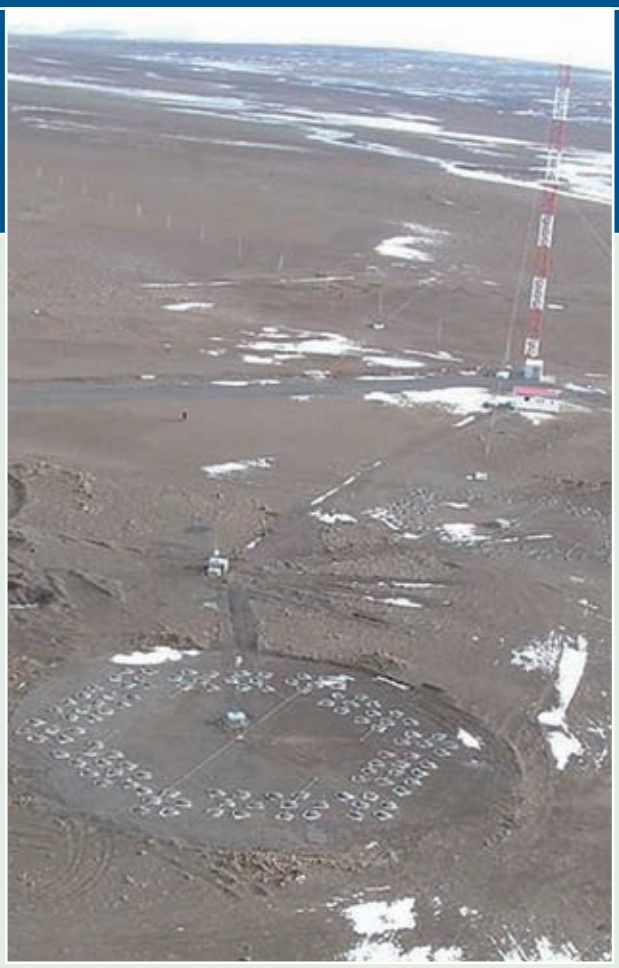
Total Number of Laboratories	Certified Laboratories
16	10



Radionuclide particulate station RN64, Dar es Salaam, United Republic of Tanzania.

Infrasound station IS11, Maio Island, Cape Verde (Atlantic Ocean).

Test during inspection of ARIX noble gas system at radionuclide station RN61, Dubna, Russian Federation.



Infrasound station IS23 on the French island of Kerguelen (southern Indian Ocean).

NOBLE GASES

Owing to their ability to seep through layers of rock and into the air, radioactive noble gases would give definitive evidence of the occurrence of a contained underground nuclear explosion. Among the noble gases released in nuclear tests, radioactive xenon is one of the most important. Its measurement is therefore of critical significance in detecting the event of a nuclear test. Traces of xenon isotopes can be measured routinely in the atmosphere, even in regions thousands of kilometres from their source. Therefore special xenon detection systems have been developed and are being deployed and tested in the IMS radionuclide monitoring network. The PTS is currently implementing a plan to integrate them in its routine operations. (For more on this, see *International Data Centre:* "Noble Gas Project".)

AGREEMENTS FOR MONITORING FACILITIES

IMS facility agreements and arrangements are concluded between the Commission and those States hosting IMS facilities in order to regulate activities such as site surveys, installation or upgrading work and certification, as well as post-certification activities (PCAs). They come into effect either upon signature by the parties or on the date on which the State informs the Commission that the national requirements have been fulfilled for the agreement or arrangement to take effect.

In 2007, an IMS facility agreement was concluded and entered into force with one State, the United Republic of Tanzania (December 2007). In comparison, in 2006 three facility agreements were concluded and four entered into force.

In total, 37 facility agreements or arrangements had been concluded by the end of the year, of which 30 have entered into force. Appropriate legal arrangements

CERTIFICATION MILESTONE: HA11, PACIFIC OCEAN

One of the milestones for 2007 in the build-up of the IMS was the completion and certification of station HA11 in June. The station is located at Wake Island (United States of America) in the middle of the Pacific Ocean. Its remoteness was a contributing factor in making this station the most expensive that the Commission has built to date. Its certification represents an important building block in the completion of the hydroacoustic network.

HA11 is a typical hydrophone station using underwater microphones. In this case, the hydrophones were installed above underwater seamounts, moored at a depth of 750 m. Cables needed to be laid across distances of about 100 km between the hydrophone and the island. Depths of up to 5000 m along the cable routes had to be taken into account and equipment was specially designed to withstand 500 bars of pressure, temperatures close to freezing point and the corrosive saline environment.

Only after clean-up teams had swiftly dealt with the legacy of Super Typhoon Ioke, which passed directly over Wake Island in August 2006, was the island declared accessible to the Commission. Work was completed there on 15 February 2007. The hydroacoustic station was certified on 8 June 2007.

With the Wake Island station installed, the hydroacoustic network is nearing completion. Ten of the eleven stations in the network are now in operation. When the final hydroacoustic station is running, the planet's oceans will be under constant surveillance through the Operations Centre in Vienna, ensuring that any underwater nuclear explosion is monitored.

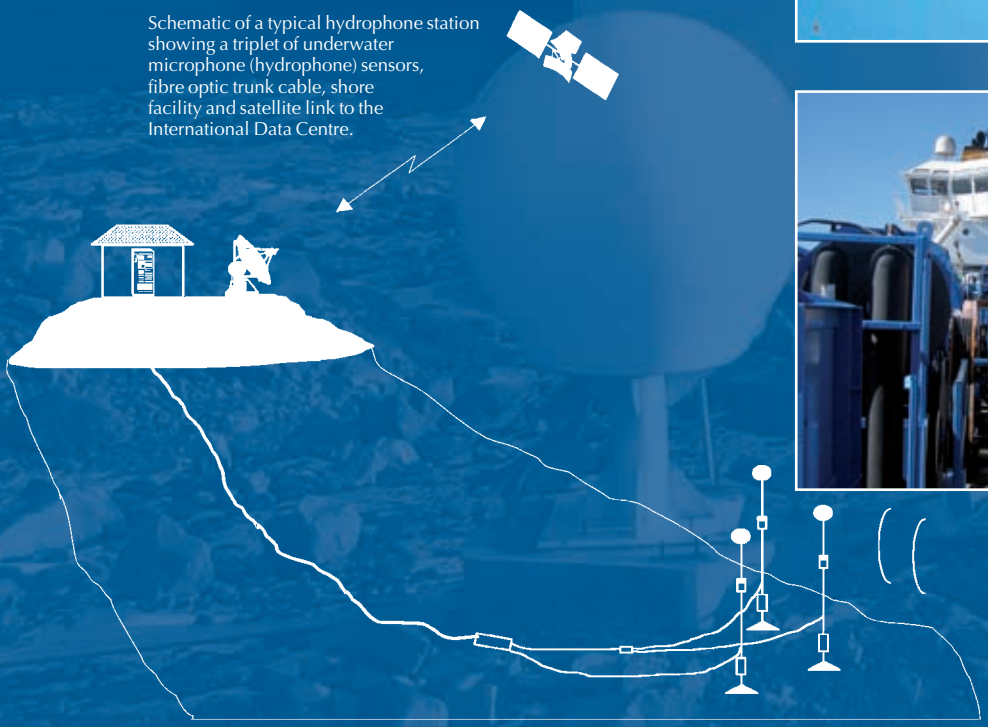
Satellite view of Wake Island.

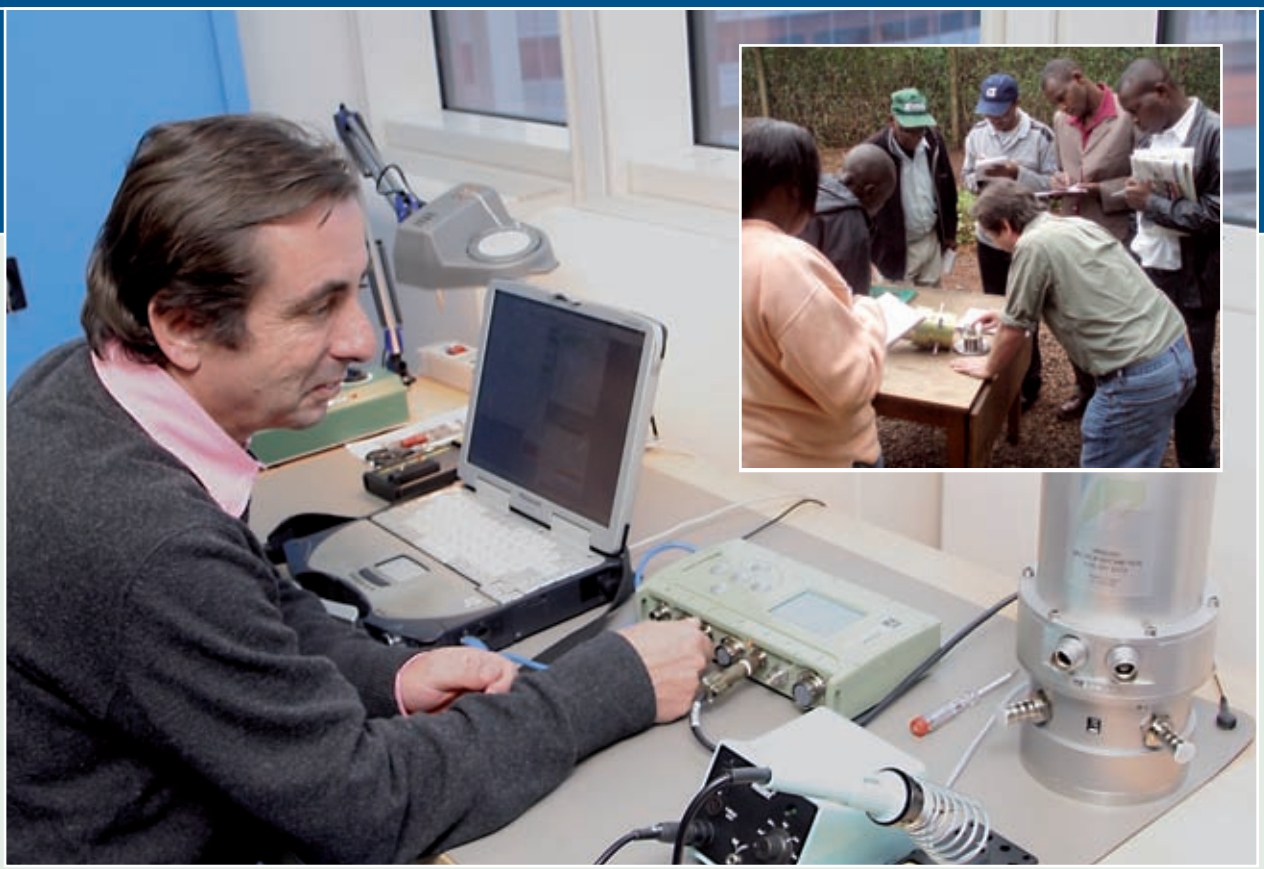
Interior view of central recording facility.

Titanium cable joint.

Hydrophone nodes on deck.

Schematic of a typical hydrophone station showing a triplet of underwater microphone (hydrophone) sensors, fibre optic trunk cable, shore facility and satellite link to the International Data Centre.





Testing of IMS infrasound certification equipment. Inset: Station operator staff receiving training at infrasound station IS32, Nairobi, Kenya.

Installation of a Global Positioning System unit at primary seismic station PS33, Zalesovo, Russian Federation.

GCI repair at auxiliary seismic station AS10, Pitinga, Brazil.

are in place for 327 facilities in 85 countries. The number of concluded agreements or arrangements and the number of agreements or arrangements that have taken effect indicate strong support by States for the establishment of the global verification regime.

SUSTAINING MONITORING FACILITIES

As the IMS installation and certification phase approaches completion, the importance of reviewing and improving operation and support of IMS facilities in provisional operations increases.

Sustainment of monitoring facilities and of the IMS network itself involves management, coordination and support for the full life cycle of each facility component, performed as efficiently and effectively as possible, as well as planning for recapitalization of a new life cycle.

In 2007, the PTS set into motion several sustainment initiatives to define, develop, implement and continuously improve the life cycle support given to IMS facilities and the network while continuing to address specific facility problems. One example is the creation of a section in the PTS specifically to handle support issues. In 2007, it saw the first full year of operation, strengthening the support and logistical aspects of IMS sustainment.

AFTER CERTIFICATION

Following the certification of a station and its incorporation into the IMS, the post-certification phase of its operation is focused on, ultimately, delivery of data to the IDC.

PCA contracts represent the fixed-cost contracts between the PTS and station operators to cover expenditure associated with this phase of activities. The total PCA expenditure in 2007 was US$14 355 000 distributed over 127 monitoring stations and 11 radionuclide laboratories. During the year, PCA contractual agreements for 10 new stations and 3 radionuclide laboratories were agreed. Existing contracts for 18 stations were also revised.

Management of PCAs changed in 2007 as a result of a new orientation in support of facility operations, involving an integrated approach across technologies. And, for the first time, all PCA expenditures were considered together by the Commission, including the projections for the coming years. Under these circumstances, PCA costs were identified as one of the highest fixed costs of the organization's budget. These will continue to rise as the IMS network grows.

Another innovation in 2007 was the introduction of an automatic system to request the annual station summary report from the primary seismic, hydroacoustic and infrasound stations (this feature was previously implemented for radionuclide stations) with a view to enhancing the management of PCA contracts and developing future maintenance, logistics and overall sustainment plans for stations. Providing such reports is one of the requirements of station operators, for which they are paid under the PCA contract. Good implementation and management of these station summary reports will potentially optimize sustainment activities and overall life cycle costs.

Visits were made by PTS staff to facilities in France, Germany, Kazakhstan, Kenya and the Republic of Korea in order to determine the essential services needed for the operation and support of stations under the present guidelines on provisional operations. Such efforts are instrumental in seeking ways to contain rising PCA costs while continuing to take into consideration the full life cycle sustainment costs of the IMS.

Global Communications

The Global Communications Infrastructure (GCI) is designed to transmit raw data from the 337 facilities of the International Monitoring System (IMS) in near real time to the International Data Centre (IDC) in Vienna for processing and analysis. The GCI is also designed to distribute to States Parties analysed data and reports relevant to verification of compliance with the Treaty. Digital signatures and keys are used to ensure that the transmitted data are authentic and have not been tampered with.

Using a combination of satellite and terrestrial communication links, this global network will enable the exchange of data by IMS facilities and States in all areas of the world with the CTBTO. The GCI is required to operate with 99.5% availability and to provide data within seconds from origin to final destination. It began provisional operations in mid-1999.

HIGHLIGHTS IN 2007

- 57 communication sites transferred to a new technology platform
- New GCI contractor achieved operational support readiness in September
- Coverage at the South Pole increased from 12 to 24 hours a day
- Addition of five very small aperture terminals and four virtual private networks
- Greater volume of data traffic carried by the GCI and by special links to the IDC, and from the IDC to remote sites.

VSAT TECHNOLOGY

The GCI is the first global satellite communications network based on very small aperture terminals (VSATs). IMS facilities and States Signatories in all but near-polar areas of the world can exchange data via their local VSAT earth stations through one of six geosynchronous satellites. The satellites route the transmissions to hubs on the ground, and the data are then sent to the IDC by terrestrial links.

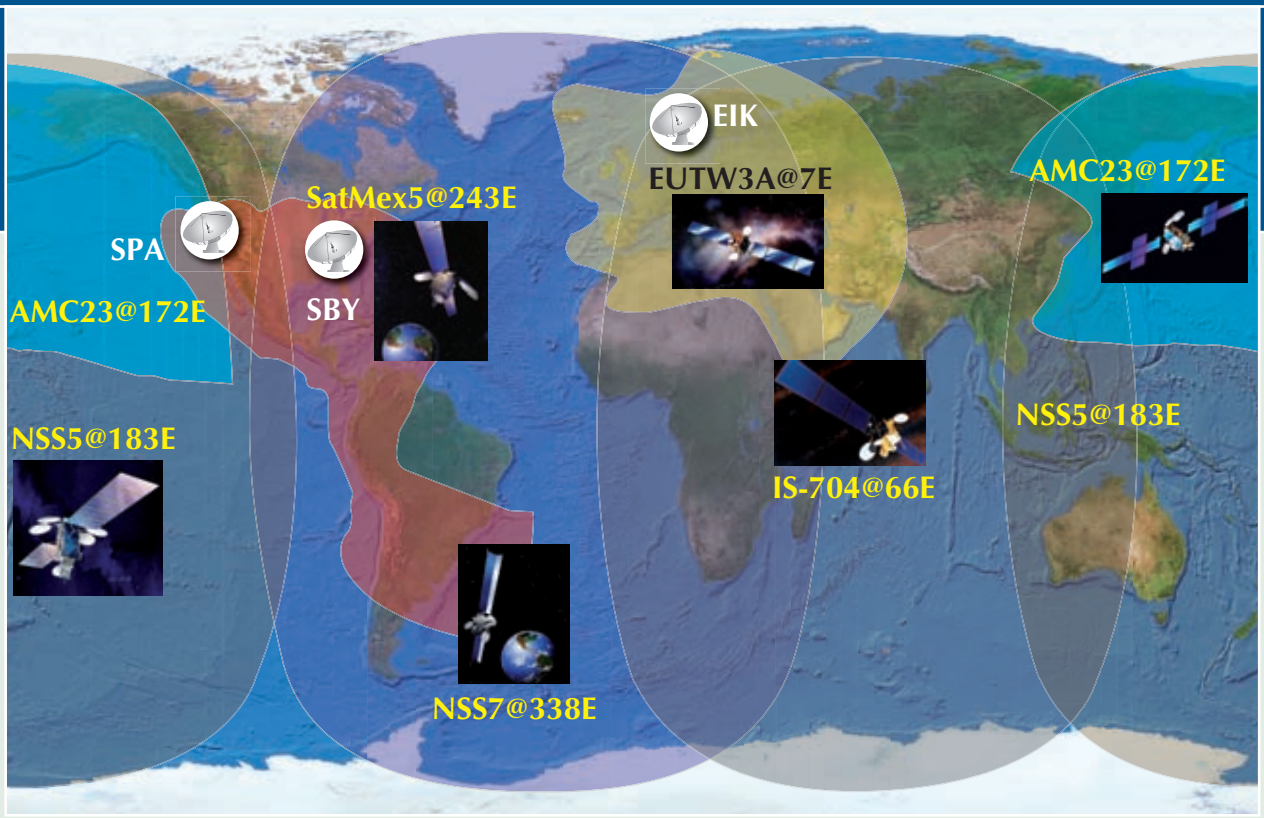
EXPANDING GLOBAL COMMUNICATIONS

GCI coverage continued to expand throughout 2007, with five new VSATs installed as well as four new virtual private networks (VPNs).

A VPN utilizes existing telecommunications networks to conduct private data transmissions. Most of the VPNs for the GCI use the basic public infrastructure of the Internet together with a variety of specialized protocols to support private communications. In situations where VSATs are still not in use or not operational, VPNs, though generally slower, provide an alternative means of communication.

At the end of the year, the GCI included 203 VSATs, 20 VPNs and four frame relay circuits. The number of planned VSATs has been reduced owing to the conversion of some sites to reliance on independent subnetworks or because some were provided with a VPN connection instead.

The volume of data traffic carried by the GCI and by special links to the IDC increased during the year from about 8300 to slightly over 8500 megabytes per day. In the other direction, data transmitted from the IDC to remote sites increased from 6500 to 7000 megabytes per day. The average GCI availability in 2007 was 96.01%, after inclusion of all outages in the VSAT and terrestrial circuits. With only the outages counted against the GCI contractor taken into account, the adjusted average availability was 99.70%.



The new Global Communications Infrastructure.

New radio frequency transmitter–receiver head installed on the antenna of the Austrian National Data Centre, Vienna.

New radio frequency transmitter–receiver head installed at a GCI VSAT site providing communications for radionuclide station RN4 and radionuclide laboratory RL2 in Melbourne, Australia.

TECHNOLOGY REFRESHMENT

The GCI technology refreshment project concerns the refreshment or upgrading of existing GCI technologies in order to benefit from advances in telecommunications and to replace ageing equipment. It also takes advantage of cost savings owing to technology improvements and increased competitiveness in the telecommunications market. Hence, in 2007, the PTS began transition of the GCI to a new technology platform provided by a new contractor; effectively, the establishment of a new GCI.

Transition to the new GCI progressed well in 2007, with 57 sites in the North America, Europe and Oceania regions being transferred to the new technology platform. In September, the new contractor achieved operational readiness to support the migrated sites.

INCREASING CONNECTIVITY WITH THE SOUTH POLE

Until 2007, GCI connectivity to auxiliary seismic station AS114 at the South Pole was only available for 12 hours a day owing to limited satellite coverage. A solution to increase the connectivity to 24 hours was found by utilizing a commercial constellation of 66 satellites in a low earth orbit providing coverage of Antarctica. Following a successful test in 2006, this solution was implemented in early 2007 in conjunction with the US National Science Foundation. The 12 hours of extra connectivity to the South Pole means that the GCI can now receive data from the South Pole 24 hours a day without interruptions, further enhancing the capabilities of the GCI to meet the needs of the growing verification system.

International Data Centre

The International Data Centre (IDC) is designed to collect, process, analyse and report on data received from facilities of the International Monitoring System (IMS), including the results of analyses conducted at certified radionuclide laboratories. The data and products are then transmitted to States Parties for their final assessment. Data and products are received and distributed through the Global Communications Infrastructure (GCI).

The IDC is situated at the Headquarters of the Preparatory Commission in the Vienna International Centre. A relational database management system forms the core of all information management. Full network redundancy has been created at the IDC to ensure high availability. A mass storage system provides archiving capacity for more than 10 years of verification data. The software utilized in operating the IDC is mostly developed specifically for the CTBT verification regime.

HIGHLIGHTS IN 2007

- Testing of prototype state of health system initiated
- 31 stations introduced into IDC operations, raising the total to 219
- Almost 15 000 full-sample spectra automatically analysed, interactively reviewed and categorized
- Atmospheric backtracking exercise performed with the World Meteorological Organization
- First contributions of infrasound data to the Reviewed Event Bulletin for selected events.

PERFORMANCE TEST FOR THE COMMISSION

On 9 October 2006, the Democratic People's Republic of Korea announced that it had conducted a nuclear weapon test. Though a clear action against the letter and spirit of the CTBT, the event provided an opportunity to demonstrate the technical capabilities of the verification system. It also provided an opportunity to test procedures in place and to highlight the added value that the system can bring to States Signatories in a situation of such political importance. Under the Treaty, after entry into force, IMS data and IDC products are provided to States Parties to enable them to draw their own conclusions. It is the prerogative of the States Parties to assess the nature of an event.

The event was well recorded throughout the world by the IMS. The signals from the event were detected at more than 10 primary seismic monitoring stations. Less than two hours later, States Signatories received the first automated data product, SEL1, containing preliminary information on the time, location and magnitude of the event. The IDC in Vienna expedited analysis of the seismic recordings and applied time lines for data processing and dissemination as envisaged in the Treaty. As a result, the PTS was able to distribute its primary data product, the REB, to States Signatories two days after the event. For the IDC waveform analysts, the event in the Democratic People's Republic of Korea was just one of over 100 events that were included in the REB for that day.

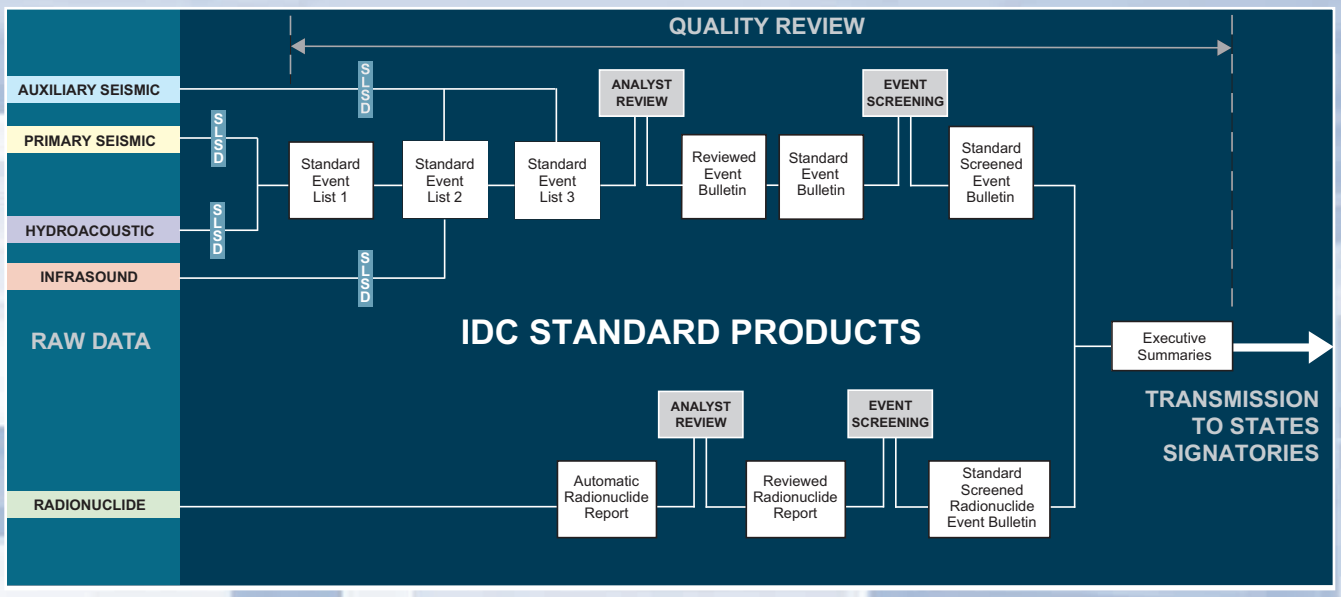
The REB confirmed the validity of the event recorded in SEL3, and its location and time. Moreover, the inclusion of signal detections at one additional primary seismic station and a range of well distributed auxiliary seismic stations, together with the improvements associated with analyst review, reduced the uncertainty in the location to a possible inspection area of 880 square kilometres. This is well below the 1000 square kilometre maximum allowed for an on-site inspection under the Treaty (for more on this subject, see *Preparing for On-Site Inspections*).

Two weeks after the event, the radionuclide noble gas monitoring station at Yellowknife in the Northwest Territories, Canada, registered an unusually high concentration of xenon-133. Applying atmospheric transport models to backtrack the dispersion of the gas, its registration at Yellowknife was found to be consistent with a hypothesized release from the event in the Democratic People's Republic of Korea.

At the time of the nuclear event on 9 October 2006, only 10 of the planned 40 stations with noble gas measuring technology were operating in test mode. The contribution of this technology to the analysis of the event demonstrated its significant role in the CTBT verification system. Recognition of the importance of noble gas technology became even more widespread in 2007 as a result, and the installation of additional noble gas systems in the IMS was expedited.

OPERATIONS CENTRE

The Operations Centre, as the focal point for operational activities, is a crucial part of integrated operations. It consists of control, escalation and multimedia rooms and is equipped with state of the art technology. From there, staff of the PTS are provided with a real time window on to the IMS. Activities of the centre include



FROM RAW DATA TO FINAL PRODUCT

The data collected by the IMS under provisional operations are processed immediately when they reach the IDC. The first automated data product, known as Standard Event List 1 (SEL1), is released within two hours of the arrival of raw data. This data product lists events recorded by the primary seismic and hydroacoustic stations of the IMS.

Requests are then made for data from the auxiliary seismic stations. The data from these stations, combined with the data from the infrasound stations and any late-arriving data, are used to produce the second automatic product (SEL2) six hours after the arrival of initial data.

This more complete event list, SEL2, is improved again after 12 hours have elapsed to incorporate any additional late-arriving data, to produce the final automated event list, SEL3.

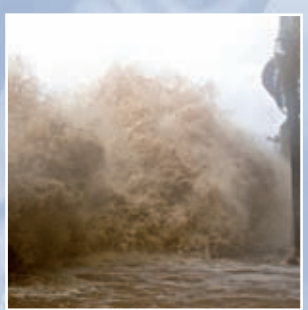
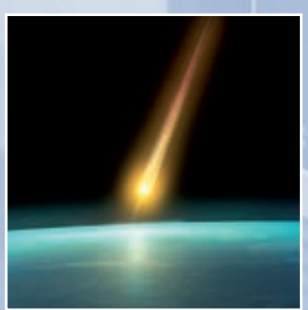
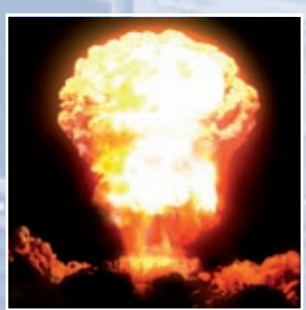
Analysts subsequently review events recorded in SEL3 to prepare the Reviewed Event Bulletin (REB). During the current provisional operating mode of the IDC, the REB is targeted to be issued within 10 days. The draft IDC Operational Manual provides that, after entry into force, the REB will be released within approximately two days. The REB for a given day contains all those events which have been detected at IMS seismic, hydroacoustic and infrasound stations and which meet specific criteria.

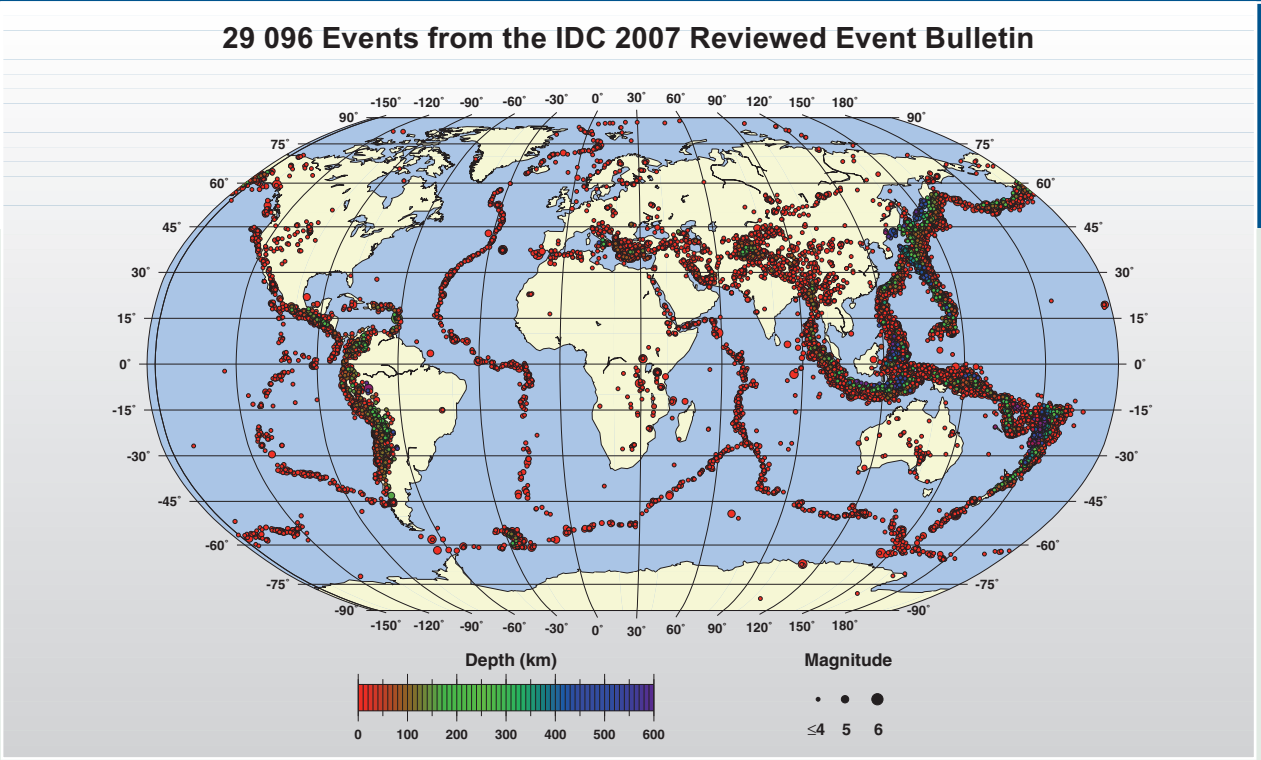
Observations from events recorded by IMS radionuclide particulate and noble gas monitoring stations typically arrive several days later than the signals from the same events recorded by the seismic, hydroacoustic and infrasound stations. Radionuclide particulate data undergo both automatic and reviewed processing to produce an Automatic Radionuclide Report and then a Reviewed Radionuclide Report (RRR) for each full gamma ray spectrum received. The information in the REB and RRR will eventually be fused, associating seismoacoustic events with radionuclide detections.

Natural and anthropogenic sources of data analysed by the IDC.







status reporting, operational incident management, and GCI data, network and systems operations. Over four thousand incidents were registered and resolved in the centre in 2007.

The main tool employed in the Operations Centre in its day to day operations is the System-Wide Incident Tracking System (SWITS), which provides a single interface for reporting and tracking all types of incident. Another key tool is the state of health (SOH) system. A prototype SOH tool, which provides the Operations Centre staff with a consolidated view of the relevant incident troubleshooting metrics, has been developed and is undergoing operational testing.

PROCESSING WAVEFORM AND RADIONUCLIDE DATA

In 2007, support and build-up of the IMS continued with testing and evaluation of data from new stations. Thirty-one newly installed or upgraded stations were introduced into IDC operations, which increased the total number of stations in operations to 219. Fourteen stations were installed in the IDC test bed.

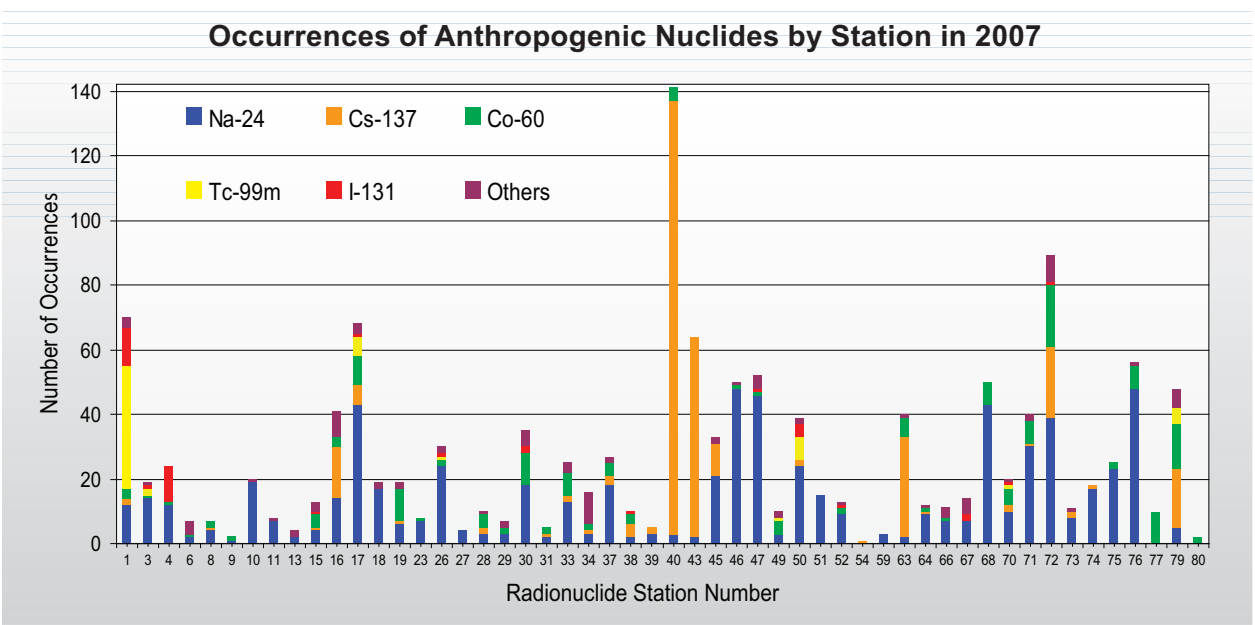
For the first time, infrasound data were introduced into the REB for selected events. Though not yet connected to network processing, a new analyst procedure for smoothly introducing infrasound data was proposed and tested. New interactive review tools were also introduced or enhanced to facilitate the operational work of the IDC infrasound specialist group.

Waveform Data

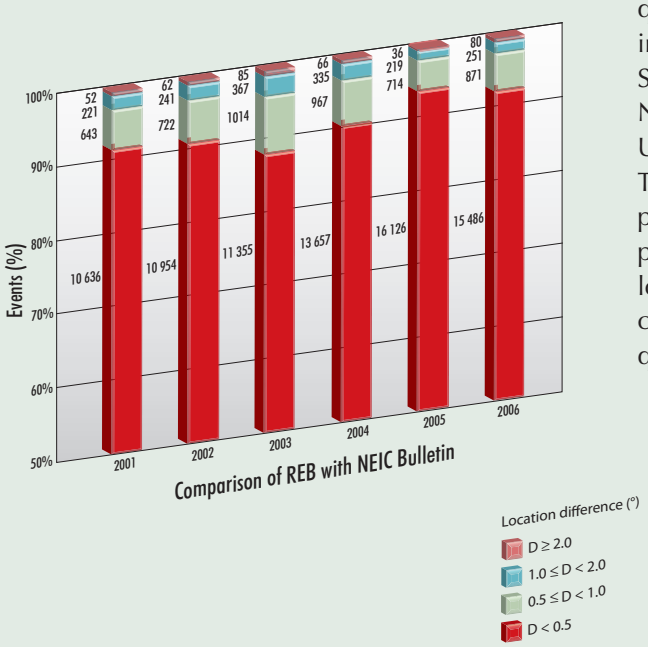
Standard IDC products were issued for each day in 2007. On average, 126 events per day were included in the automatic SEL3 and 80 events per day in the REB, compared with 122 and 76 respectively during 2006. Deficiencies in data processing software were identified, enhancements were proposed and software upgrades were tested and evaluated. In addition, data were forwarded to recognized tsunami warning organizations (see “Tsunami Early Warning Systems” at the end of this section).

Radionuclide Data

During 2007, 14 879 full-sample spectra were automatically analysed, interactively reviewed and categorized. Of these, 10 606 were Level 1 spectra (containing normal natural nuclides). Four spectra were categorized as Level 5 (containing multiple anthropogenic nuclides and therefore Treaty-relevant), and the respective samples were sent for reanalysis to cer-



tified laboratories in accordance with standard procedures. In addition, 57 samples which were not Level 5 were sent for reanalysis to laboratories for quality control purposes.

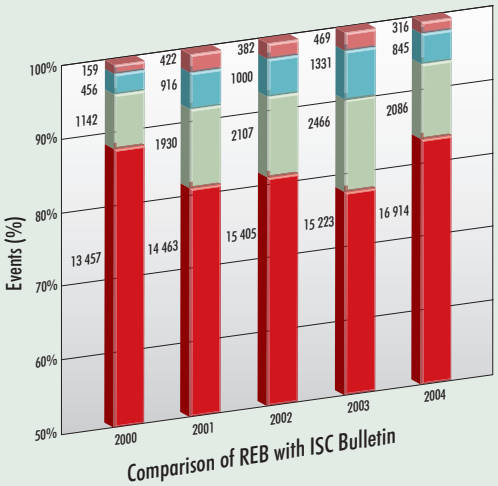


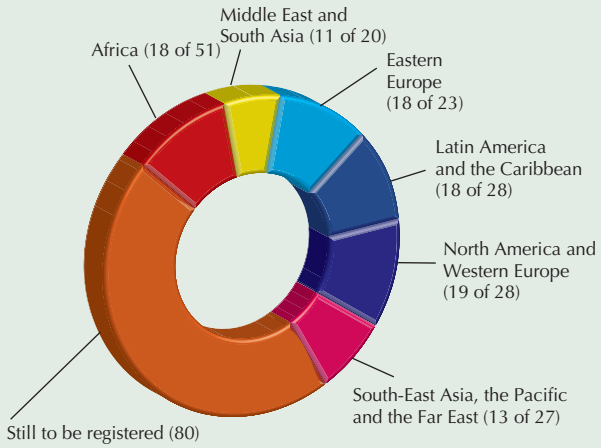
For the assessment of bulletin quality, comparisons of the REB are carried out on an annual basis with the most recognized global seismological bulletins from the ISC and NEIC. The average difference in event locations between the REB and the reference bulletin is one quality indicator considered.

IDC locations are within about 100 km of most of the corresponding NEIC event locations (i.e. more than 97% within 1° (about 111 km)), while for the more comprehensive ISC bulletin more than 90% of the IDC locations are within 1° of the ISC locations.

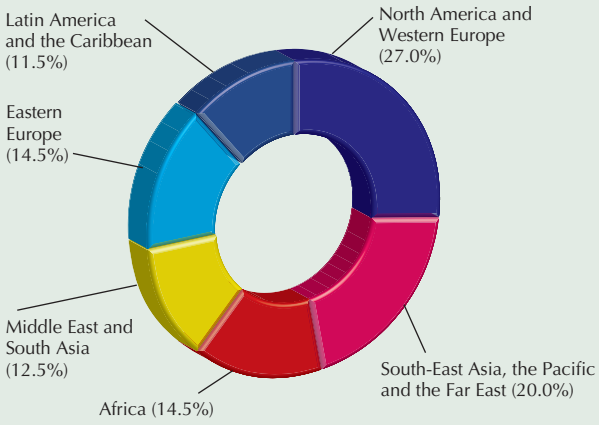
ASSESSING QUALITY OF FINAL PRODUCTS

Performance monitoring activities concerning the quality of IDC products continued in 2007 by comparing the REB with the bulletins from the International Seismological Centre (ISC) for the year 2004 and the National Earthquake Information Center (NEIC) of the US Geological Survey for the years 2005 and 2006. These assessments measure the accuracy and completeness of the IDC bulletin relative to the most comprehensive data sets available for global seismic event locations. Though the IMS seismic network is not yet complete, the assessments confirmed the current high quality of IDC products.





Secure Signatory Accounts of States Signatories at the End of 2007



Percentage of Users of IMS Data and IDC Products by Geographical Region at the End of 2007

NATIONAL DATA CENTRES

A National Data Centre (NDC) is an organization with technical expertise in the CTBT verification technologies working under the guidance of a National Authority. Its functions may include sending IMS data to the IDC and receiving data and products from the IDC.

The 'NDC in a box' is a software package developed by the IDC for use at NDCs, giving them the capability to receive, process and analyse IMS data. By the end of 2007, this software had been distributed to more than 100 States Signatories. The software package was made available to States Signatories through the IDC secure web site.

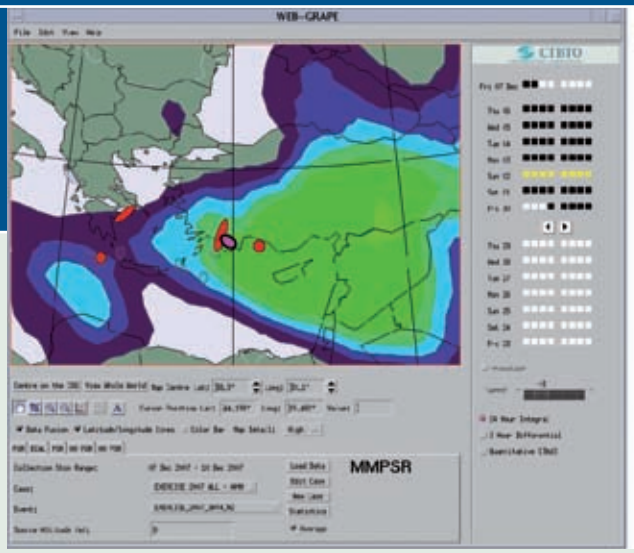
By the end of 2007, 97 secure signatory accounts (one for each requesting State Signatory) had been established and a total of 859 users from these States Signatories had been authorized to access IMS data and IDC products and receive technical support. This is an increase of more than 50 over the number of users in 2006. More than 1000 requests from authorized users regarding technical information were received and resolved during the year.

NOBLE GAS PROJECT

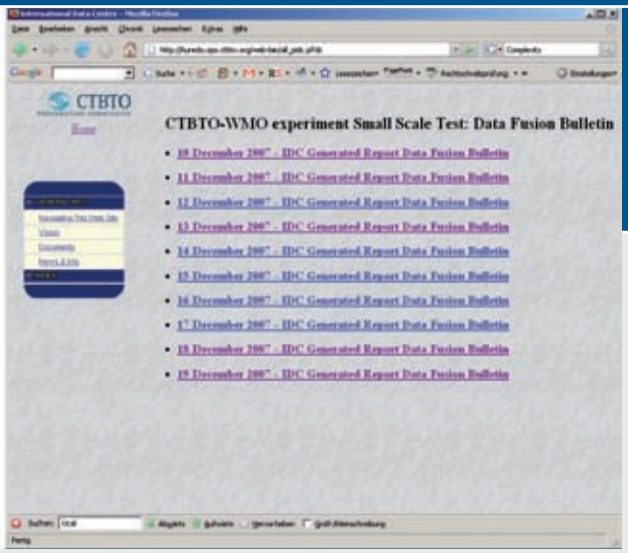
Special noble gas detection systems have been developed and are currently being deployed in the IMS radionuclide network. A plan was approved by the Commission to integrate this new technology into its routine data processing. In June, distribution to interested States Signatories of raw data from the first 14 stations to have noble gas systems installed began. In October, distribution of automatic analysis results began for testing purposes. (To understand the important role that noble gases play, see *International Monitoring System:* "Noble Gases".)

Distinguishing the civil anthropogenic background level of airborne radionuclides from radiation emissions due to Treaty-relevant events is a challenging task that involves nuclear physicists, statisticians and meteorologists. The PTS is currently putting emphasis on obtaining a comprehensive understanding of possible sources, atmospheric transport and variability of the noble gas radioxenon over time. This is possible through cooperation with scientists from more than 20 institutions worldwide in the International Noble Gas Experiment (INGE).

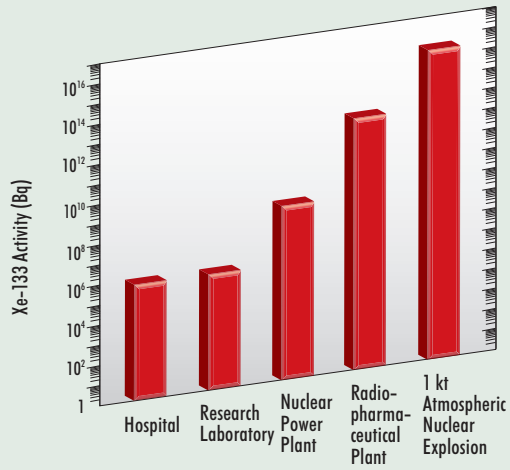
In June 2007, the European Union approved a joint action to support PTS research activities to explore the anthropogenic xenon background and to fund a PTS field campaign for studying and measuring the xenon background in several parts of the world. The results gained during the last eight years from INGE have clearly shown that the radioxenon background is



Interactive source location analysis related to the CTBTO–WMO exercise in 2007, using WEB-GRAPE, a Web based graphics engine. The display shows the so-called multiple model possible source region (MMPSR, shown by contours) for releases on 2 December 2007 involving results from the PTS and nine WMO centres. The simulated release location on this day was the SEL3 event indicated by a pink ellipse. All other SEL3 events of that day are indicated by red ellipses.



Data Fusion Bulletin (template) issued daily by the PTS throughout the exercise to communicate interactive source location and data fusion results to States Signatories.



The radioxenon background is much more complex than initially thought and originates from different types of civil source releasing xenon isotopes into the atmosphere. The chart compares a typical daily source strength against what is produced by an atmospheric nuclear test with a 1 kt yield.

much more complex than was initially thought. Indeed, initially unforeseen anthropogenic sources have been identified, such as radioisotope production facilities for medical applications.

TRACKING RADIONUCLIDES THROUGH THE ATMOSPHERE

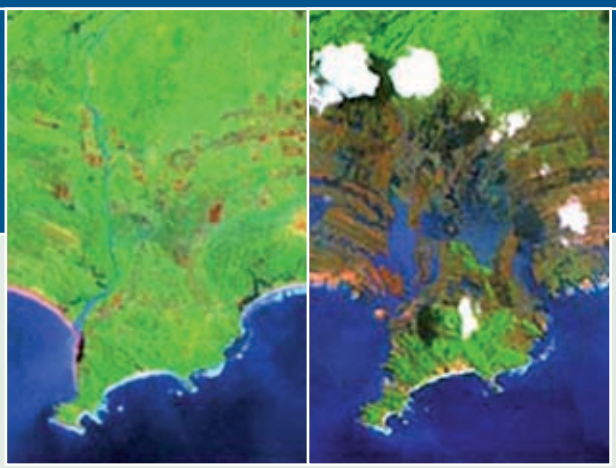
Early in 2007, following a significant period of scientific and technical cooperation, the Executive Council of the World Meteorological Organization (WMO) approved the inclusion of the CTBTO–WMO response system in its Global Data Processing and Forecasting System. In the third quarter of 2007, the PTS formally approached the WMO Secretariat to nominate Regional Specialized Meteorological Centres for atmospheric backtracking.

Atmospheric backtracking is the method applied by the PTS to resolve, to the best possible extent, the 'field of regard' of Treaty-relevant (Level 5) radionuclide detections by the IMS. This method also provides the possible source regions associated with a scenario of such detections. The specialized WMO centres are the authorized external institutions that would attend to PTS requests for support in such Level 5 cases.

ANTALYA ATMOSPHERIC BACKTRACKING EXERCISE

As part of a group of small scale focused tests, the PTS performed an atmospheric backtracking exercise with WMO centres based on a seismic event, recorded by the PTS, 90 km south-west of Antalya, Turkey, on 2 December 2007.

Atmospheric transport modelling software developed by the PTS predicted which stations would be affected by radioactive debris assumed to be released from



Satellite images of a coastal area of Sumatra, Indonesia, before and after the tsunami of December 2004.

the location in Turkey. The hypothetical radioactive samples were treated as Level 5 radionuclide detections, and nine WMO centres were subsequently requested to support the PTS with atmospheric backtracking results in near real time. These centres were located in: Beijing, China; Exeter, United Kingdom; Melbourne, Australia; Montreal, Canada; Obninsk, Russian Federation; Offenbach, Germany; Toulouse, France; Washington, D.C., USA; and Vienna, Austria.

Afterwards the results were analysed by the IDC and, for the first time ever, a daily Data Fusion Bulletin combining waveform and radionuclide data was produced. During the experiment it was possible to narrow down the possible sources to three events occurring on the same day and only 150 km apart. Throughout the exercise, neither the WMO centres nor the IDC data fusion specialists knew which event had been selected as the mock source.

The CTBTO–WMO response system is an excellent example of how the harmonization of computational and development efforts of WMO meteorological centres and the PTS in the area of atmospheric transport modelling is serving to benefit both organizations and their member States.

TSUNAMI EARLY WARNING SYSTEMS

Following the tragedy caused by the tsunami in the Indian Ocean in December 2004, the Commission tasked the PTS to test the provision of data for the purpose of tsunami warning.

A number of tsunami warning institutions began receiving IMS data in near real time on a test basis. During this test phase, which lasted over a year, tsunami warning centres confirmed the usefulness of IMS data. In comparison with data from other existing monitoring networks, IMS data were found to arrive at these tsunami warning centres with less delay and higher reliability. This provides potentially vital additional warning time in which to activate alerts in the event of a possible tsunami threat.

Consequently, in November 2006, the Commission endorsed a recommendation to provide continuous data in real time to relevant tsunami warning organizations. Four tsunami warning centres currently receive data from about thirty IMS stations. These centres are located in Australia, Japan, Malaysia and the USA (Hawaii).

While the purpose of the global verification regime is to verify compliance with the CTBT, the use of IMS data to mitigate the catastrophic consequences of tsunamis is an example of the wide range of potential civil and scientific applications for which these data could be used.

Preparing for On-Site Inspections

The Treaty verification system monitors the world for evidence of a nuclear explosion. If such an event were to occur, concerns about possible non-compliance with the Treaty could be addressed through a consultation and clarification process. States could also request an on-site inspection (OSI), which is the final verification measure under the Treaty and can be invoked only after the Treaty has entered into force.

The purpose of an OSI is to clarify whether a nuclear explosion has been carried out in violation of the Treaty and to gather those facts which might assist in identifying any possible violator.

HIGHLIGHTS IN 2007

- Selection of potential participants for the 2008 Integrated Field Exercise (IFE) in Kazakhstan
- Receipt of valuable equipment contributions from States Signatories for the IFE, along with logistical support from the host country and sponsorship from the European Union
- Training courses and equipment tests in Austria, Brazil, France, Hungary, Sweden and Ukraine
- Completion of the OSI Test Manual, a version of the draft OSI Operational Manual to be tested during the IFE
- Further elaboration of the draft OSI Operational Manual.

PREPARING FOR THE KAZAKHSTAN FIELD EXERCISE

Under the constant guidance of the Commission, in 2007 the PTS continued preparations for an Integrated Field Exercise (IFE), to be conducted in Semipalatinsk, Kazakhstan, in September 2008, as part of preparations for OSI readiness. The exercise will provide a unique opportunity for the Commission to test in an integrated manner most of the major elements of the OSI system (except drilling and active seismic techniques) during a compressed period of four to five weeks. Valuable input was received from States Signatories for the continuation of preparations and further development of the IFE.

Preparations generated important opportunities to enhance readiness for the complex field mission. Objectives of the IFE preparations in 2007 were twofold: (a) selection of potential participants and their familiarization with the OSI Test Manual and elements of an OSI, such as data collection through overflights, environmental sampling and seismic monitoring activities; and (b) further preparation of the necessary technologies, equipment and tools.

To further elaborate the IFE design and scenario, the PTS worked closely with the host country, making site visits and conducting assessments addressing health and safety, transportation and other logistical issues. A list of equipment to be donated as contributions in kind during the exercise was also created and confirmed. Procurement continued for equipment needed for the base of operations, at which the inspection team will be stationed during the exercise in the field.

During 2007, the PTS also initiated the development of a field information management system (FIMS). The FIMS prototype was successfully tested during previous field exercises and has shown immense value in analysing data in the field. Final refinement and system enhancement will continue during 2008.

DIRECTED EXERCISE INSIDE THE CHERNOBYL EXCLUSION ZONE

Preparations for the IFE have included several directed exercises in previous years, each focusing on the operational testing of specific inspection techniques as well as infrastructure development and logistics. After the cycle of testing specific methodologies for an OSI, the PTS conducted a directed exercise in the Chernobyl Exclusion Zone in Ukraine during the first two weeks of June 2007. The exercise focused on the measurement of radioactivity levels and on the identification of radionuclides, in particular by means of gamma radiation monitoring on the ground and from the air, as well as on environmental sampling and analysis of solids, liquids and gases. Most of these techniques were examined in previous exercises, but the objective during the Chernobyl exercise was refinement of operational procedures in combination with a focused test of the OSI radiation protection regime to ensure the safety of the inspection team.

Environmental sampling equipment used during the 2007 directed exercise in Chernobyl, Ukraine.

Concrete containment surrounding remains of nuclear power plant unit in the Chernobyl Exclusion Zone.

Radioactivity check-up during the directed exercise.

Familiarizing participants with deep resistivity measurement equipment during the OSI advanced training course in Szolnok, Hungary.

DEVELOPING AND TESTING EQUIPMENT

Core equipment collected by the PTS encompasses state of the art technology, such as instruments for high resolution geophysical surveys, gamma radiation monitoring devices and environmental sampling equipment. In the event of an actual OSI, the CTBTO has to be prepared to move approximately 10 tonnes of sensitive core equipment in six days from Vienna to anywhere in the world. Therefore the development and testing of OSI equipment are a priority as far as the OSI objectives of the Treaty are concerned.

An exercise conducted in Seibersdorf, Austria, in June 2007 successfully concluded the development of equipment for bulk gas sampling from atmospheric air and subsoil gas for noble gas analysis. This equipment will be used in the IFE.

Valuable operating experience was gained with the Seismic Aftershock Monitoring System (SAMS) by conducting two field tests, in Sweden in August and during an advanced training course in Hungary in October and November. These two test environments

High resolution geomagnetic survey during the OSI advanced training course in Szolnok, Hungary.

allowed advanced raw data collection and more realistic data processing sequences to be embedded into a small scale simulation. This experience was used to gear up the aftershock system for the IFE. In 2007, procurement of all SAMS equipment was also completed.

Equipment needed for techniques employed in the continuation period of an OSI, which follows the initial period subject to appropriate approval, was purchased and deployed during the advanced training course in Hungary. The equipment consisted of one ground penetrating radar system, one system to conduct deep electrical and electromagnetic surveys, and one geomagnetic system. Further to these techniques, a 'blinded' high resolution gamma spectrometer, which displays only Treaty-relevant nuclides, was successfully deployed during the advanced training course in Hungary and the directed exercise in Ukraine.

Capacity Building

The Preparatory Commission offers States Signatories training courses and workshops in technologies associated with the International Monitoring System, the International Data Centre and on-site inspection, thereby assisting in the strengthening of national scientific capabilities in related areas. Such capacity building serves to enhance the real and potential technical capabilities of States Signatories throughout the globe, as well as those of the Commission. As technologies expand and improve, so too does the knowledge and experience base of designated personnel. Training courses are held at the Headquarters of the Commission, as well as in numerous external locations, often with the assistance of hosting States.

HIGHLIGHTS IN 2007

- Successful completion by six participants of the first analyst training course since 2003
- 13th introductory course for members of Permanent Missions in Vienna
- Workshops on noble gas technology in Las Vegas and infrasound technology in Tokyo
- Training courses in France and Hungary related to the 2008 Integrated Field Exercise
- Procurement of a new e-learning management system.

Participants of IMS–IDC regional training course for station operators and NDC technical staff, Costa Rica, July 2007.

TRAINING STATION OPERATORS

In 2007, the PTS organized six training courses for station operators and NDC technical staff: an IMS–IDC introductory training course, a technical training course on radionuclide detection equipment, an IMS–IDC regional technical training course, two technical training courses on noble gas monitoring systems and an IDC analysts' course.

In total, 28 NDC technical staff members from 21 States Signatories and 29 station operators from 18 States Signatories participated in the courses. In addition, four participants from one State Signatory attended a PTS visitors' programme.

NOBLE GAS TECHNICAL TRAINING

The most recent addition to the provisional verification system is the radionuclide noble gas monitoring station. As demonstrated after the nuclear event in the Democratic People's Republic of Korea in October 2006, this new element of the radionuclide network can provide valuable information on suspected nuclear tests, even at great distances (see also *International Data Centre:* "Performance Test for the Commission"). The noble gas technical training course provides station operator training on the specialized equipment installed at these stations. As there is more than one equipment supplier, training is provided by each of the providers, either at its own facilities or at an operational station. Station operators are given theoretical as well as hands-on experience during this five day course.

TRAINING ANALYSTS

Review of data and generation of reviewed data products are at the core of PTS functions. Analysts sift through volumes of data, providing an accurate accounting of all events that meet specific criteria. The job is demanding and requires a high degree of skill. The IDC analysts' course is the longest of the PTS training courses; it lasts three months and requires a huge commitment from the participants. From the numerous applicants, only a handful are chosen to come to Vienna for the demanding course of instruction. Most of the course offers hands-on training with the analytical tools, preceded by a short theoretical introduction. By the end of the three months, the trainees leave in a much stronger position to apply for analyst positions at the PTS.

TRAINING INSPECTORS

Two OSI training courses related to the 2008 field exercise in Kazakhstan were conducted in 2007, during which the PTS used the opportunity to test technologies and equipment provided as contributions in kind (for more on the exercise, see *Preparing for On-Site Inspections*). In July, the French Government

Team discussion during the OSI introductory training course in Arcueil, France, July 2007.

Noble gas workshop, Las Vegas, November 2007.

hosted an introductory course for the IFE at the French Training Centre for the Prohibition of Chemical Weapons in Arcueil. An advanced training course, hosted by the Hungarian Government, was conducted in the Peace Support Training Centre of the Hungarian Defence Forces, Szolnok, and in the field camp, Táborfalva, in October and November.

The main objectives of these courses were to familiarize participants with procedures, software and equipment to be used in the IFE, to enhance teamwork and to provide feedback critical for the continuing preparation of the exercise. The courses also enabled the PTS to identify training and logistical requirements, as well as potential risks, that will need to be addressed prior to the start of the IFE.

The 13th introductory course for members of Permanent Missions in Vienna was conducted in October at the Headquarters of the Commission. An important element of the OSI programme, this introductory course represented a valuable opportunity to create another outreach forum for OSI activities, as well as ensuring that the role and work of the PTS with regard to OSI are understood and approved by the main stakeholders.

A successful regional course was conducted in Brazil in April. An impressive field demonstration of a decontamination facility by the nuclear–biological–chemical unit of the Brazilian Army and an emergency evacuation demonstration provided a unique opportunity to train the selected experts. It was also an opportunity to raise awareness of the importance of improvement and continual training for the specific field expertise related to OSI.

NOBLE GAS AND INFRASOUND WORKSHOPS

Las Vegas

In November, a noble gas workshop was held in Las Vegas, Nevada, USA, and hosted by the Pacific Northwest National Laboratory. The workshop focused on research and development necessary for xenon measurement, calibration of noble gas systems, operational testing of noble gas equipment, quality control concepts for the noble gas network, categorization of noble gas events and certification requirements for IMS noble gas systems. A special session on the nuclear event in the Democratic People's Republic of Korea in October 2006 was also conducted.

Tokyo

Also in November, the annual infrasound technology workshop was held in Tokyo. The event was hosted by the Japan Weather Association and the Center for the Promotion of Disarmament and Non-Proliferation of the Japan Institute of International Affairs. The workshop covered technical issues related to the study of infrasound in general and specific topics such as wind noise reducing systems, data processing and instruments. The workshop highlighted the major advances in infrasound research during the past year.

E-LEARNING

Traditionally, training activities by the PTS have been limited mostly to typical classroom training and field

exercises. To enhance the learning opportunities for States Signatories and PTS staff, e-learning was introduced to complement classroom training.

For example, as part of the development of the OSI regime, a training programme has been developed for future inspectors. E-learning is intended to replace as much as possible the lecture room part of OSI courses for future inspectors, leaving more time for actual field activities during the courses.

The primary objectives of the e-learning practices of the organization are as follows: (a) to increase the number of participants in PTS training activities; (b) to prepare individuals prior to their participation in traditional classroom training and field exercises; (c) to reduce lecture room time in favour of field activity or hands-on exercises; (d) to provide a means for individuals to learn at their own pace where appropriate; and (e) to broaden the base of potential candidates for posts in the PTS, thereby assisting recruitment.

The e-learning facilities of the PTS took a large step forward in 2007 with the procurement of a learning management system. The new system has all of the necessary features such as computer platform independence and compatibility with the official languages of the United Nations. In addition, it meets the requirements of the existing hardware, software, networking and security systems of the PTS. Courses can be updated quickly and easily. The system is secure and allows tracking of security violations as well as robust password checking. The user interface is clear and easy to follow, which is essential in view of its diverse population of users. The cost of the system was also notably lower than that provided by the previously selected contractor.

The contract for the new system was signed in November. Implementation, installation and testing of the system were scheduled to take place in the first quarter of 2008.

Improving Performance and Efficiency

Throughout the process of establishing the verification system, the Provisional Technical Secretariat of the Preparatory Commission aims for effectiveness, efficiency and continual improvement through the implementation of its Quality Management System (QMS). The QMS is focused on customers, such as States Signatories and National Data Centres, and aims at fulfilling the responsibilities of the Commission in establishing the CTBT verification regime in compliance with the requirements set forth in the Treaty, its Protocol and relevant documents of the Commission.

HIGHLIGHTS IN 2007

- Quality Management Workshop in Vienna
- Second revision of the Quality Manual, which describes the QMS, issued in February
- Ongoing discussions on a preliminary draft Process Metrics Manual, which would include potential key performance indicators (KPIs) for radionuclide data and data products
- Development of a prototype Web based tool to compute and display KPI status and trends
- Evaluation of the OSI directed exercise conducted in Chernobyl in June, in preparation for the evaluation of the 2008 Integrated Field Exercise.

Participants of the Quality Management Workshop, Vienna, May 2007.

Discussion during the Quality Management Workshop.

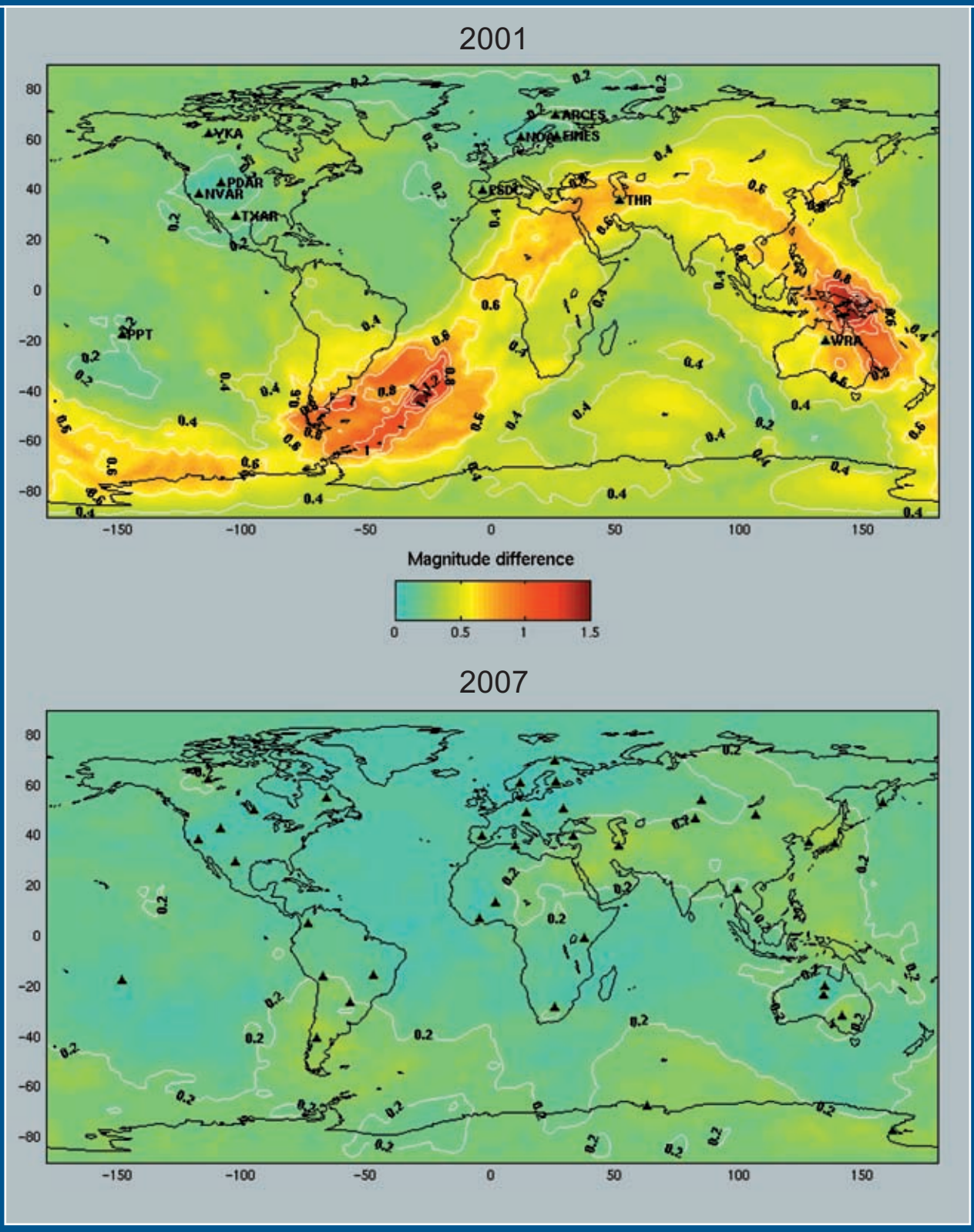
DEVELOPING THE QUALITY MANAGEMENT SYSTEM

The function of the Quality Management System (QMS) is to identify and put into effect key performance indicators (KPIs) for evaluating PTS processes and products, thus facilitating management review and continual improvement. KPIs are metrics used to quantify progress in reaching objectives and to indicate the strategic performance of an organization. They are primarily employed to assess the status of an organization and to prescribe a course of action. The aim of the QMS is to support the objective of consistently meeting verification system requirements. It encompasses all contributing PTS processes and work products.

In 2007, potential KPIs were being identified for the PTS processes related to verification system development activities and provisional operation and maintenance products and services. In 2007, a preliminary draft Process Metrics Manual, compiling the KPIs corresponding to radionuclide data, data products and associated processes, as well as the methods to compute these KPIs, was issued and discussed during the Quality Management Workshop held in Vienna in May.

To enhance the role that KPIs can play in assessing the performance of the PTS, a prototype visualization tool has been developed to display the status and trends of KPIs. This will enable users to understand more readily how well the PTS is performing in a particular area of its work. The tool has so far been populated with a number of KPIs identified for the radionuclide technology.

In fulfilment of the testing and evaluation requirements of the QMS, and as a follow-up of recommendations that arose from the first system-wide performance test (SPT1), conducted during 2004–2006, a number of small scale exercises were conducted in those areas for which improvements were identified during SPT1. These exercises were evaluated by the PTS in 2007.



Improvement in Seismic Detection Capability

The two maps show simulations of the estimated detection capability of certified primary seismic monitoring stations at the end of 2001 and 2007 relative to that of the complete IMS primary seismic network under ideal conditions (full station availability and low background noise).

Relative detection capability is shown as a difference in body wave magnitude. An event is considered detected when its signal exceeds the noise level by a factor of 3 at three or more stations,

At the end of 2001, when only 11 primary seismic stations had been certified, there were large areas with magnitude differences above 0.4 (represented by yellow to brown shading), and some local differences were as high as 1.4 (represented by red to dark brown shading).

At the end of 2007, the same areas showed differences in magnitude of only 0.2 on average, with 37 stations certified. Overall, at the end of 2007, magnitude differences in several parts of the world fell to below 0.2.

EVALUATING PREPARATIONS FOR ON-SITE INSPECTIONS

During OSI field exercises, standard operating procedures, equipment or software packages related to the inspection activities and techniques outlined in the Protocol to the Treaty are tested and evaluated under realistic field conditions. The evaluation of such exercises permits identification of those aspects that need improvement in order to further develop inspection techniques.

In June 2007, a directed exercise was conducted in Chernobyl with the purpose of validating the OSI methodologies for gamma radiation monitoring as well as environmental sampling and analysis (see *Preparing for On-Site Inspections:* "Directed Exercise Inside the Chernobyl Exclusion Zone"). The evaluation of the directed exercise concluded that its objectives had been essentially achieved. Several areas of improvement were identified, including: the robustness and equipment of the radionuclide laboratory, standard operating procedures for the design and set-up of the base of operations, and fire safety and other measures. It was recommended that the upgraded operating procedures be incorporated into the inspectors' training syllabuses in order to enhance the awareness of participants in the IFE.

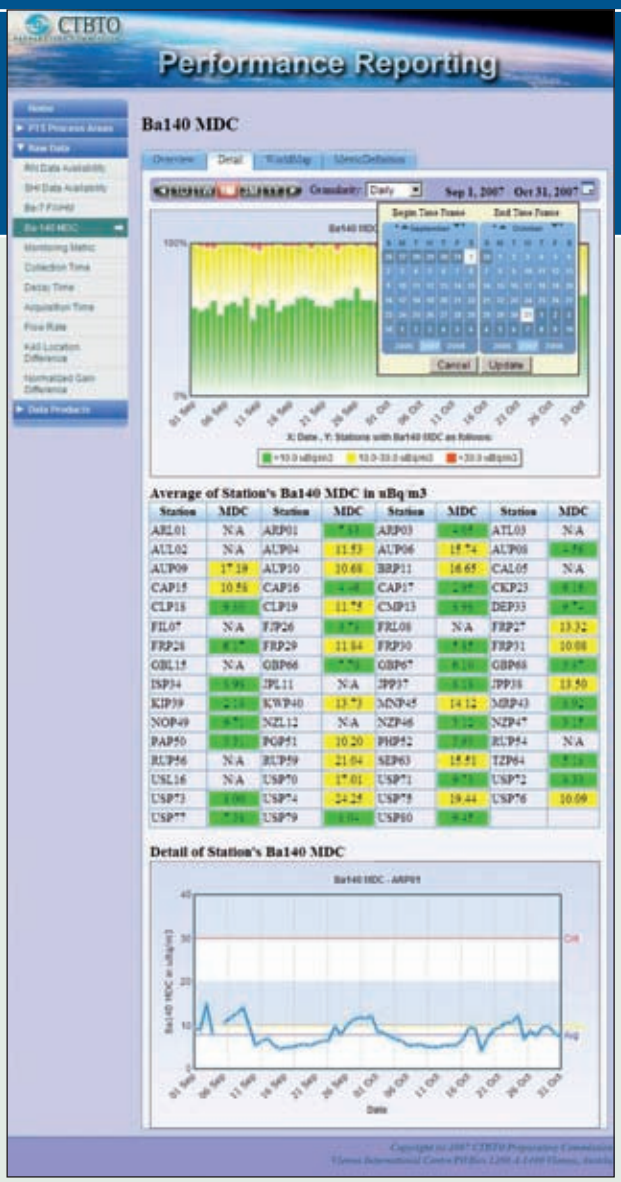
The first draft framework for evaluating the IFE was discussed in a meeting of the evaluation core team and an expert advisory group in December 2007, which provided useful feedback. The draft framework document details, among other things, the evaluation criteria and the basis for the selection of external evaluation team members.

2007 directed exercise, Chernobyl. Top left: preparation of environmental sampling equipment. Top right: monitoring of radiation contamination of personnel and equipment after data gathering in the field. Above: debriefing session on gamma radiation monitoring.

FEEDBACK FROM NATIONAL DATA CENTRES

In its Quality Policy, the PTS underlines its focus on customers. NDCs, as the main users of PTS products and services, meet in annual NDC evaluation workshops in order to provide their feedback to the PTS. However, for the first time in 10 years the NDC evaluation workshop could not take place in 2007 owing to budgetary constraints.

In 2007, a Web based system to facilitate tracking of the implementation of recommendations from NDC evaluation workshops was developed following the 2006 workshop. This system also provides a repository for evaluation recommendations and all recommendations since 1998 have been entered into the system.



The upper chart in the screenshot shows the average minimum detectable concentration (MDC) of barium-140 for the IMS radionuclide particulate network. The lower part of the screenshot shows, at the station level, the average MDC and the variation in MDC over the period specified.

MDC, which is one of the key specifications for a particulate station, is the smallest concentration of a radionuclide that can reliably be detected and quantified in a spectrum. An upper limit for barium-140 of 30 μBq/m^3 has been set for particulate stations under operational conditions.

Annual reports are now produced, compiling the status of implementation of recommendations.

EVALUATION PRACTICES AND THE UNITED NATIONS

The United Nations Evaluation Group (UNEG) is a professional network that brings together the units responsible for evaluation in the United Nations system, including the specialized agencies, programmes and affiliated organizations. UNEG aims to strengthen the objectivity, effectiveness and visibility of the evaluation function across the United Nations system and to advocate the importance of evaluation for learning, decision making and accountability. UNEG provides a forum for members to share experience and information, discuss the latest evaluation issues and promote simplification and harmonization of reporting practices.

The Commission supports the activities of UNEG and has contributed its experience in integrating quality management and evaluation. Best-practice guidelines, norms and standards are issued by UNEG for adoption by the member organizations.

Policy Making

Policy making is effected through the Policy Making Organs (PMOs). These are the vehicles by which the CTBTO Preparatory Commission makes and implements decisions concerning the work of the organization.

The plenary body of the Commission, which is composed of all States Signatories, can be understood as the assembly of shareholders, providing political guidance and oversight to the Provisional Technical Secretariat from States Signatories. The plenary is the primary PMO, and its work is assisted by three subsidiary bodies, each of which is also composed of representatives of States Signatories as well as experts nominated by them.

These subsidiary bodies are Working Group A, Working Group B and the Advisory Group. Working Group A deals with budgetary and administrative matters facing the organization, while Working Group B considers scientific and technical issues related to the Treaty. Both Working Groups submit proposals and recommendations for consideration and adoption by the Commission. Together with the Commission, these two subsidiary bodies make up the PMOs of the organization. In addition, the Advisory Group of qualified experts serves in a supporting role, advising the Commission through its Working Groups on financial, budgetary and associated administrative matters.

HIGHLIGHTS IN 2007

- Introduction of an addition to the Staff Rules concerning potential conflicts of interest, with a view to strengthening good governance practices within the organization
- Decision to change the organization of work and the duration of meetings of Working Group B
- Pilot project initiated to facilitate participation of experts from developing countries in official technical meetings of the Commission
- New reporting structure for the reports of the Executive Secretary to the PMOs
- Review of the structure and layout of all official documents to create a more user friendly information environment.

MEETINGS IN 2007

In 2007, the Preparatory Commission was chaired by Ambassador Ana Teresa Dengo, Permanent Representative of Costa Rica. The Commission met in plenary twice, from 19 to 22 June at its Twenty-Eighth Session and from 12 to 14 November at its Twenty-Ninth Session.

Working Group A was chaired by Ambassador Abdulkadir Bin Rimdap (Nigeria) and held its Thirty-First Session from 4 to 6 June and its Thirty-Second Session from 8 to 9 October. Working Group B was chaired by Mr Hein Haak (Netherlands) and also held two sessions: its Twenty-Eighth Session from 5 to 16 February and its Twenty-Ninth Session, which was divided into two parts, from 21 May to 1 June and from 20 August to 7 September. The Advisory Group, chaired by Mr André Gué (France), held the first and second parts of its Twenty-Eighth Session from 23 to 27 April and from 14 to 18 May, and its Twenty-Ninth Session from 10 to 14 September.

Working Group B decided to change the organization of its work and the duration of its meetings. Commencing in 2008, this subsidiary body will take a more flexible approach to its scheduling, keeping the number of meetings to the minimum required and avoiding overlap of meetings where possible.

EXPANDING PARTICIPATION OF EXPERTS FROM DEVELOPING COUNTRIES

In 2007, the PTS initiated a pilot project to facilitate participation of experts from developing countries in official technical meetings of the Commission. The project was financed by voluntary contributions from Finland, Indonesia, Malaysia, Morocco, the Netherlands, New Zealand, Norway and South Africa.

Three experts, from Kenya, Peru and Thailand, were selected to participate in the project. These experts took part in sessions of Working Group B and other technical meetings, including the Quality Management Workshop in May and the meeting of the expert advisory group for the IFE in December. In addition, these experts benefited from a series of technical briefings by the PTS on key verification related issues.

On the basis of an implementation report prepared by the PTS, the Commission decided in November 2007 that the pilot project should continue in 2008 in light of its initial success.

SUPPORTING THE POLICY MAKING ORGANS

The PTS, itself a preparatory organ, is the body that executes the decisions adopted by the Commission and its subsidiary bodies. Like the Commission, it is multinational in composition: staff are recruited from States Signatories on as wide a geographical basis as possible. As far as the meetings of the PMOs are concerned, the role of the PTS is to provide substantive and organizational support to the meetings of the various bodies that make up the Commission. From organizing conference facilities and arranging interpretation to drafting official documents of the various sessions and advising the Chairpersons, the PTS is a vital element in the work of the PMOs.

In 2007, a number of improvements were made to those PTS processes underpinning the policy work of the organization. For example, a new reporting structure for the reports of the Executive Secretary to the PMOs was implemented, as part of a broader suite of measures to streamline the dissemination of information, in particular routine data, to States Signatories. The structure and layout of all official documents were also changed to create a more user friendly information environment.

CREATING A VIRTUAL WORKING ENVIRONMENT

The PTS prides itself on its ability to create and provide a virtual working environment for those unable to attend regular meetings of the PMOs. State of the art technologies are employed to transmit the proceedings of each official plenary meeting around the globe in real time. Meetings are recorded and transmitted live via a secure web site, the Experts Communication System (ECS), before being archived for reference purposes. In addition, supporting documents related to each particular session are distributed to States Signatories through the ECS, and participants are notified of new documents by email alerts.

Outreach

A key duty of the Provisional Technical Secretariat of the CTBTO Preparatory Commission is to promote understanding of the objectives and principles of the Treaty. Essentially, this is done through interaction with the international community, including States, international organizations, academic institutions and non-governmental organizations (NGOs). It involves educating people about the activities of the Commission, promoting signature and ratification of the Treaty by States and fostering international cooperation in the exchange of verification related technologies.

HIGHLIGHTS IN 2007

- Ratification of the Treaty by the Bahamas, the Dominican Republic, Moldova and Palau
- International cooperation workshops for States of South-East Asia, the Pacific and the Far East in Manila and for States from the Caribbean region in Nassau
- Focused interaction with the Alliance of Small Island States, the Inter-Parliamentary Union and the United Nations
- Media days, press briefings and presentations in Austria, Hungary, Sweden, Switzerland, Ukraine and the USA
- Improvements to the public web site.

TOWARDS UNIVERSALITY OF THE TREATY

In 2007, the Treaty was ratified by the following four countries: the Bahamas, the Dominican Republic, Moldova and Palau.

As of 31 December 2007, the CTBT had been signed by 177 States and ratified by 141 States, including 34 of the 44 States listed in Annex 2 to the Treaty, whose ratification is required for the Treaty to enter into force.

INTERACTING WITH THE INTERNATIONAL COMMUNITY

The PTS continued its efforts in 2007 to raise awareness and enhance understanding of the Treaty, to facilitate the implementation of the decisions of the Commission on the establishment of the verification regime and, in particular, the installation of IMS facilities, and to promote signature and ratification and participation in the work of the Commission.

In the course of 2007, the PTS maintained dialogue with States through bilateral visits in capitals and interactions with Permanent Missions in Vienna, Berlin, Geneva and New York. The emphasis was on States hosting IMS facilities and States that have not yet signed or ratified the Treaty (particularly those listed in Annex 2 to the Treaty). Contacts were also made in the framework of relevant multilateral fora at international, regional and subregional levels.

The Executive Secretary of the Preparatory Commission visited the Bahamas, Brazil, Costa Rica, Mexico, the Philippines and Slovakia with a view to strengthening their interaction with the organization.

To advance relationships with relevant international organizations as well as to reach out to States that have not yet signed or ratified the Treaty, the Executive Secretary and PTS staff members attended a number of multilateral gatherings.

Latin America and the Caribbean

There were many outreach opportunities in Latin America and the Caribbean in 2007. A celebration of the 40th anniversary of the Treaty of Tlatelolco, which prohibits nuclear weapons in Latin America and the Caribbean, was held in Mexico City in February. The Committee on Hemispheric Security of the Organization of American States (OAS) held a special meeting on consolidation of the regime established by the Treaty of Tlatelolco as well as on the worldwide comprehensive nuclear test ban, in Washington, D.C., in March. In June, the thirty-seventh regular session of the OAS General Assembly met in Panama City. In November, the Bahamas hosted a PTS Regional Workshop on CTBTO International Cooperation for States from the Caribbean Region (see "International Cooperation" below).

PTS involvement in these fora provided numerous opportunities for repeated bilateral contacts with representatives of States that have still to sign or ratify the

CTBT. These efforts were rewarded when the Dominican Republic ratified in September and the Bahamas ratified in November. A number of other States also made declarations of intent to sign and/or ratify the Treaty, notifying the PTS that progress was being made internally.

Small Island States

Small island States, whether in the Pacific, Caribbean, Asian or African region, constitute a large share of the number of outstanding signatures and ratifications of the CTBT. For this reason, in 2007 the PTS began a cooperation initiative with the Alliance of Small Island States (AOSIS). In October, the Executive Secretary was invited to address the AOSIS Plenary Meeting in New York. The meeting was chaired by the Permanent Representative of Grenada and was attended by representatives of the following countries: Antigua and Barbuda, the Bahamas, Barbados, Belize, Cape Verde, the Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Maldives, Mauritius, Palau, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Tonga, Trinidad and Tobago, and Tuvalu. The briefing provided an opportunity to those present to become better acquainted with the CTBT and the activities of the organization, and the feedback received was highly positive.

Inter-Parliamentary Union

The PTS began a cooperation effort with the Inter-Parliamentary Union (IPU) in 2007. The PTS was represented at the 116th Assembly of the IPU, which was held in Indonesia between 29 April and 4 May, and in November the Executive Secretary addressed the annual Parliamentary Hearing at United Nations Headquarters in New York. In 1999, the IPU adopted a resolution in support of the CTBT. It is hoped that, 10 years later, another resolution will be adopted in the 118th Assembly. The PTS is assisting States Signatories that have signalled to the organization their interest in presenting and supporting such a resolution.

Liaising with the United Nations

The PTS continued its close liaison with the United Nations. To mark the 10th anniversary of the PTS, in March an exhibition was organized at the United Nations Office at Geneva entitled "Verifying the Comprehensive Nuclear Test Ban". While in Geneva, the Executive Secretary met with senior representatives of the WMO, the IPU, the Geneva Centre for Security Policy and the European Organization for Nuclear Research to further promote the CTBT and to strengthen the relationship of the Commission with these organizations.

In New York, the Executive Secretary attended the general debates of the sixty-second session of the United Nations General Assembly in September and October. At the First Committee, he participated in a panel discussion together with the United Nations High Representative for Disarmament Affairs, the Secretary-General of the Conference on Disarmament, the Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW) and the Representative of the Director General of the International Atomic Energy Agency to the United Nations. Addressing the First Committee, the Executive Secretary reported on the 2007 Conference for Facilitating the Entry into Force of the CTBT ("Article XIV conference"), which was held in Vienna in September, and presented an overview of the progress made by the PTS since its inception. (For more information on the conference, see *Facilitating the Treaty's Entry into Force*.) While in New York, he met with the United Nations Secretary-General, Mr Ban Ki-moon.

Further Activities

Further cooperation and coordination with international organizations and institutions included PTS participation in the 12th Annual Conference on Arabian Gulf Security: Internal and External Challenges in Dubai in March, the United Nations Workshop on Implementing United Nations Security Council

Resolution 1540 (2004) in Africa in Gaborone, Botswana, in November, the Twelfth Session of the Conference of the States Parties of the OPCW in The Hague, also in November, and the Sixth Republic of Korea–United Nations Joint Conference on Disarmament and Non-Proliferation Issues in Seoul in December.

In Vienna, the Executive Secretary continued dialogue with States through the Permanent Missions and received a number of high level visitors, especially on the occasions of the first session of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) (Vienna, 30 April to 11 May) and the Article XIV conference. These occasions provided further opportunities for bilateral discussions on common issues related to recent developments in the work of the Commission.

INTERNATIONAL COOPERATION

In 2007, the PTS focused its workshop activities on States of the South-East Asia, the Pacific and the Far East region and of the Latin America and the Caribbean region. Workshops were held in June and November respectively, with several objectives: (a) enhancing the understanding of the CTBT, the work of the Commission and the technologies of the CTBT verification regime; (b) promoting the establishment of the verification regime in the region; (c) promoting the entry into force of the CTBT; (d) reviewing possible benefits of applying CTBT verification technologies for civil and scientific purposes; and (e) exploring and identifying various ways and means to promote Treaty cooperation among neighbouring States.

Philippines

A Workshop on CTBTO International Cooperation for States of South-East Asia, the Pacific and the Far East was held in June in Manila, Philippines, with the close cooperation of the host Government. Representatives from 15 countries in the region participated in the workshop.


International cooperation workshop, Manila, Philippines, June 2007.

Presentations were made by experts on a range of topics, including the political significance and membership benefits of the CTBT, the verification regime, NDCs, civil and scientific applications of the CTBT verification technologies, including tsunami warning systems, and promotion of cooperation among States Signatories. The workshop was informative and productive, and an excellent opportunity for participants to enhance their understanding of the CTBT and the role of the CTBTO in the international nuclear disarmament arena. Many countries, in particular the small island States, declared the IMS data and IDC products useful in combating natural disasters.

Bahamas

In November, the PTS organized a Regional Workshop on CTBTO International Cooperation for States from the Caribbean Region in Nassau, Bahamas, at the invitation of the Government. The workshop was funded by a voluntary contribution from the Government of Austria. It was attended by representatives from 11 Caribbean countries, as well as from the Caribbean Disaster Emergency Response Agency and the United Nations Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean, the Chairperson of the Preparatory Commission, the Presidency of the 2007 Article XIV conference, and speakers from Canada, Mexico, Peru and the Universities of Puerto Rico and the West Indies.

During the workshop, a high level round table meeting was held with representatives of those States in the region that have yet to sign or ratify the Treaty. The meeting was chaired by the Executive Secretary of the Preparatory Commission and the Permanent Secretary of the Ministry of National Security of the Bahamas. On the margins of the workshop, the Executive Secretary held bilateral meetings with the Acting Prime Minister and Minister for Foreign Affairs of the Commonwealth of the Bahamas, the Honourable Mr Brent Symonette, and with the Acting Minister of National Security, Senator Elma Campbell.

On the first day, the Bahamas announced that it had sent its instrument of ratification to the Secretary-General of the United Nations, as Depositary of the Treaty, in New York. Barbados and Trinidad and Tobago also announced their intention to ratify the CTBT in the near future.

PROMOTING THE TREATY AND THE COMMISSION

In 2007, PTS public information activities focused on the promotion of the Treaty and the work of the Commission to targeted audiences, including the media, States, NGOs, scientific and academic institutions, think tanks and public policy institutes.

The public web site served as the main tool for the dissemination of information, with the PTS relying increasingly on electronic dissemination techniques for communicating press releases and feature articles to targeted audiences, particularly in States that had not yet signed or ratified the Treaty.

Other tools that the PTS employed included briefings and presentations, the use of the CTBTO exhibition and film, as well as printed material, and participation in important disarmament and non-proliferation seminars and conferences.

Proactive Media Relations

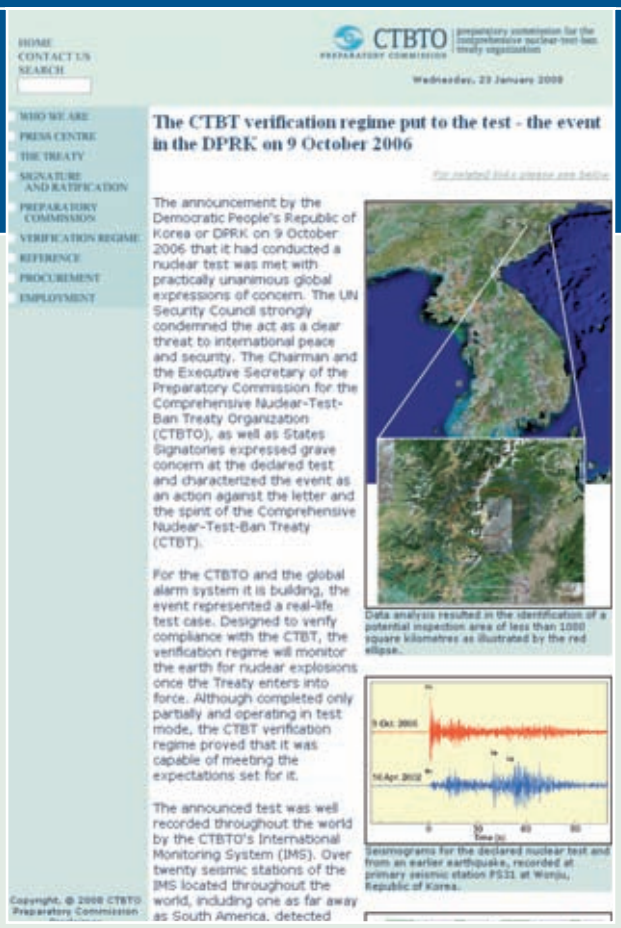
Press conferences were held in the context of the 10th anniversary of the PTS (March), meetings of the Preparatory Commission (June and November), the Article XIV conference (September) and the United Nations General Assembly (October). Over 370 articles referring to the CTBT were published in the world's media in 2007. In addition, a large number of individual press briefings and interviews were given to print and broadcast media. The PTS organized media days and press briefings during the OSI exercises and training courses in Ukraine (June), Sweden (August) and Hungary (October). Also, the PTS assisted in the filming of documentaries on the CTBT verification regime by German, French–German and Japanese television networks.

Targeted Outreach

In cooperation with the Geneva Forum, the PTS held a seminar entitled "Verifying Compliance with the Nuclear Test Ban" in March at the United Nations Office at Geneva. The CTBTO exhibition was displayed for two weeks.

A CTBTO information booth and exhibition on "Verifying the Comprehensive Nuclear Test Ban" ensured the visibility of the PTS at the 2007 meeting of the NPT Preparatory Committee in Vienna in April and May. A CTBTO information booth with the CTBTO film and live-feed data on display gave an opportunity for the nearly eight hundred participants at the Carnegie International Nonproliferation Conference in Washington, D.C., in June to familiarize themselves with the Treaty and its verification regime.

The Article XIV conference in Vienna in September provided a natural opportunity for conducting specialized and focused outreach.



State of the Art Public Web Site

The CTBTO public web site is a key tool for the broadest possible dissemination of information. Daily press articles referring to the Treaty and the work of the Commission are placed on the web site, along with CTBTO press releases and feature articles. Improvements in 2007 included the addition to the home page of areas dedicated to daily press articles, the CTBTO film, the 2006 nuclear test in the Democratic People's Republic of Korea and the status of payment of assessed contributions by States Signatories.

Information Products

Although the PTS information strategy relies primarily on the electronic distribution of information, several major printed products were produced and/or updated in 2007: (a) an issue of *CTBTO Spectrum* focusing on the North America and Western Europe region; (b) a special issue of *CTBTO Spectrum* on the occasion of the Article XIV conference; (c) a *Basic Facts* supplement entitled "The build-up of the IMS, the event in the DPRK, and tsunami early warning", produced in English, French and Spanish; (d) *Objectives and Activities,* a leaflet translated into all six official languages of the United Nations; (e) *Potential Civil and Scientific Applications of the CTBT Verification Technologies,* a completely rewritten brochure including, among other things, information on the contribution of the Commission to tsunami warning; and (f) a brochure on the outcome of the Article XIV conference entitled *Conference Urges States to Ratify Nuclear Test Ban*. All products were made available on the public web site.

CTBTO Film

In 2007, the script of the information film, *CTBT: For a Safer and More Secure World,* was rewritten. In addition to an exploration of the findings of the Commission in connection with the announced nuclear test in October 2006, with new footage, interviews and animations, a new introduction by the Secretary-General of the United Nations, Mr Ban Ki-moon, was added, in which he urges support for the Treaty.

Management

Effective and efficient management of the activities of the Provisional Technical Secretariat of the CTBTO Preparatory Commission, including support of the Policy Making Organs, is ensured mainly through the provision of administrative, financial and legal services.

A wide variety of general services are also provided, from arrangements concerning shipments, customs formalities, visas, identity cards, laissez-passers and low value purchases to insurance, tax, travel and telecommunication services, as well as standard office and information technology support and asset management. Services provided by external entities are continuously monitored to ensure that these are being provided in the most efficient, effective and economical way.

Management also involves coordinating with the other international organizations located in the Vienna International Centre over planning of office and storage space, maintenance of the premises and common services, and enhancement of security efforts.

HIGHLIGHTS IN 2007

- Provisional completion of the restructuring process
- Continued increase in efficiency of operations
- Zero real growth Programme and Budget
- Number of full payments of annual assessed contributions made in 2007 greater than in previous years
- Increase in the representation of women in the Professional category to 32.9%.

RESTRUCTURING THE PROVISIONAL TECHNICAL SECRETARIAT

As the CTBT verification system has grown, the PTS has had to adapt to manage that growth. In 2004, a report reviewing the organizational structure of the PTS was issued to States Signatories. This report contained a number of recommendations on restructuring the organization and led to the formulation of a 'road map' to guide implementation of the recommendations over a two year period.

Restructuring involved redefining the functions of the technical Divisions responsible for the IMS and the IDC. The operational elements of the IMS and IDC Divisions were merged to create a Division responsible for provisional operation, testing and evaluation of the verification system. The technical functions that support the IMS and IDC operations were then combined into a Division responsible for engineering, development and logistical support.

The year witnessed provisional completion of this process, with the last step due to take place in the first quarter of 2008. Restructuring has already delivered benefits for the organization. In addition to promoting efficiency, the new structure will be more cost effective, leading to potential savings in future years. In line with the trend of previous years, the PTS continued and will continue to achieve more with the same level of resources.

FINANCE

2007 Programme and Budget

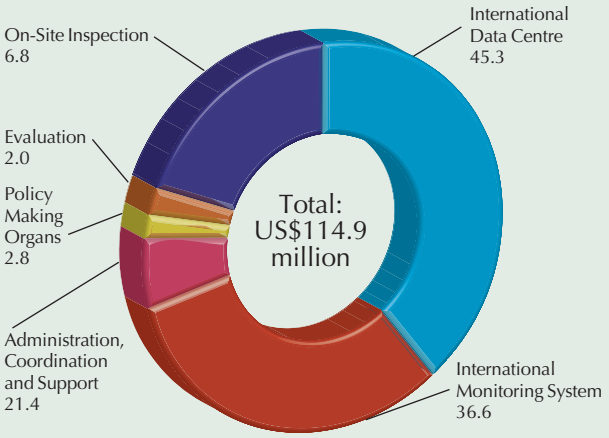
The 2007 Programme and Budget was prepared within the constraint of zero real growth and maintained the split currency system (US dollar and euro) for assessing the contributions due from States Signatories. This system was implemented in 2005 to reduce the exposure of the Commission to the effects of fluctuations in the value of the US dollar against the euro.

The Budget for 2007 amounted to US$48 277 100 and €48 564 400. At the 2006 Programme and Budget exchange rate of 0.8270 euro to 1 US dollar, the total US dollar equivalent of the 2007 Budget was $107 000 300, representing a 2.27% nominal growth, but a 0.61% decrease in real terms.

On the basis of the actual average exchange rate in 2007 of 0.7292 euro to 1 US dollar, the final total US dollar equivalent of the 2007 Budget was $114 876 661 (see graphic on facing page). Of the total Budget, 79% was allocated to verification related activities, including an allocation of $16 745 485 to the Capital Investment Fund (CIF), established for the build-up of the IMS.

Assessed Contributions

As of 31 December 2007, the collection rates of assessed contributions for 2007 amounted to 74.51% of the US dollar portion and 74.44% of the euro portion. These collection rates are lower than the 2006 collection rates as of 31 December 2006, which were 81.58% and 80.63% respectively.



Distribution of 2007 Budget by area of activity (millions of US dollars). (An average exchange rate of 0.7292 euro to 1 US dollar was used to convert the euro component of the 2007 Budget.)

However, the number of States that had paid their 2007 assessed contributions in full as of 31 December 2007 was substantially higher than the number that had made full payments of their 2006 contributions as of 31 December 2006, namely 99 as opposed to 78.

Expenditure

The expenditures against the 2007 Budget amounted to $98 353 172 , of which $15 921 389 was from the CIF.

For the General Fund, the unused budget authority amounted to $15 699 393, which means that 84% of the total Budget for the year was implemented. This relatively low implementation rate has to be understood in the light of the austerity measures, including high contingency margins, which were made necessary by the low collection rates referred to above.

For the CIF, approximately 52.5% of the allotted funds were spent by the end of 2007.

PROCUREMENT

The PTS completed 420 procurement processes in 2007, a similar number to that in 2006. Procurement contracts for testing and evaluation and PCAs concluded within 2007 covered 10 IMS stations, 5 stations at which noble gas equipment was tested and 4 radionuclide laboratories. Also, the PTS conducted negotiations on various stages of work for a further 46 IMS stations, including the testing of six noble gas systems.

HUMAN RESOURCES

The PTS secured the human resources for its operations by recruiting and maintaining highly competent and diligent staff for all programmes. Recruitment was based on securing the highest standards of professional expertise, experience, efficiency, competence and integrity. Due regard was paid to the principle of equal employment opportunity, to the importance of recruiting staff on as wide a geographical basis as possible, and to other criteria stipulated in the relevant provisions of the Treaty as well as the Staff Regulations.

As of 31 December 2007, the PTS had 253 staff members from 71 countries, compared with 254 staff members from 66 countries at the end of 2006. The chart below provides information on the distribution of staff members in the Professional category by geographical region. Table 3 shows the distribution of regular staff members by field of work.

The PTS continued its efforts to increase the number of women in the Professional category, which rose to 32.9% at the end of 2007 from 29.2% at the end of 2006. In comparison with 2006, the number of female staff members at the P5 level remained the same, while there was an increase at the P4 and P3 levels and a decrease at the P2 level. The recruitment efforts continued against the background of low numbers of female applicants for the majority of vacancies for scientific

Number of Professional Staff Members by Geographical Region (2004–2007)

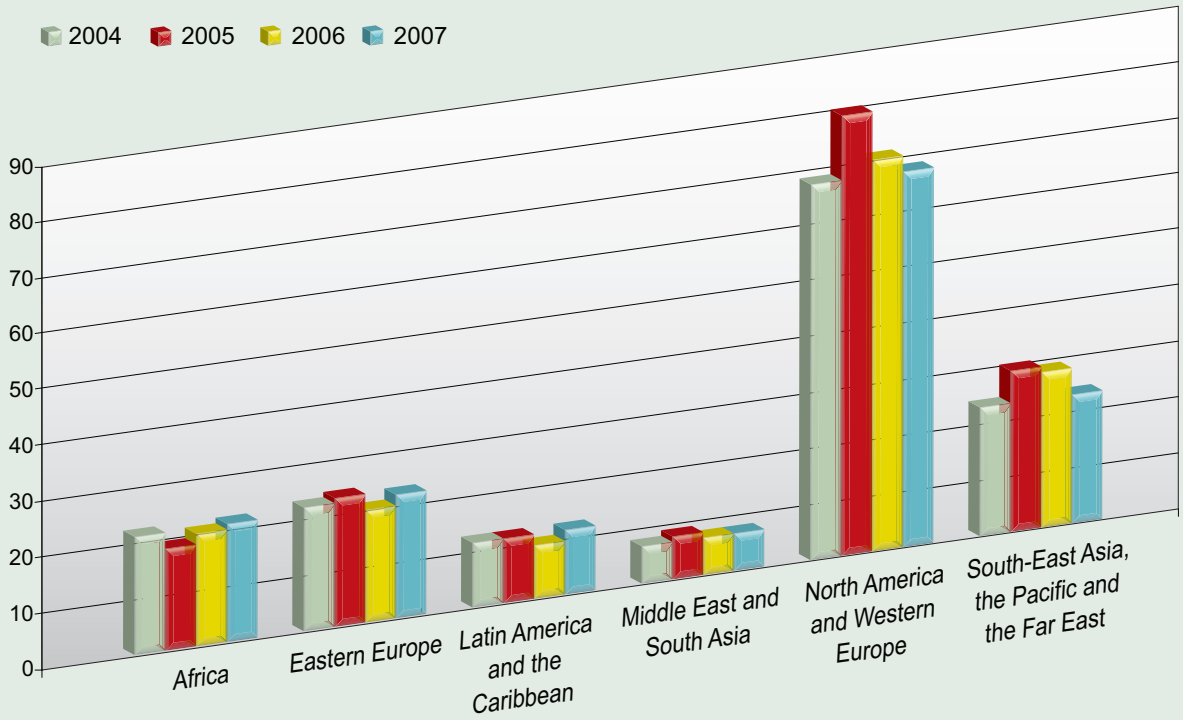


Table 3. Regular Staff Members by Field of Work (31 December 2007)

Field of Work	Professional	General Service	Total
Evaluation Section	4	1	5
International Monitoring System Division	34	24	58
International Data Centre Division	62	16	78
On-Site Inspection Division	15	6	21
Subtotal, verification related	*115 (72.78%)*	*47 (49.47%)*	*162 (64.03%)*
Office of the Executive Secretary	4	3	7
Internal Audit	1	1	2
Division of Administration	21	28	49
Legal and External Relations Division	17	16	33
Subtotal, non-verification-related	*43 (27.22%)*	*48 (50.53%)*	*91 (35.97%)*
Total	**158**	**95**	**253**

posts. Discussions were held with some States Signatories regarding the modalities of encouraging female candidates to apply for vacant positions in the PTS.

In 2007, the PTS appointed 44 staff members. In addition, it processed contracts for 92 consultants, 13 interns and 6 linguists; 177 contracts were processed for short term staff.

The PTS continued to provide opportunities for staff to develop their 'soft' skills in courses tailored for the mutual benefit of the PTS in carrying out its work programmes and of staff members in their job performance and career development. During the year, 138 staff members participated in internal and external training covering a wide range of topics, such as conflict management, performance management, international diplomacy, gender sensitivity and diversity, and management and supervision, as well as information technology.

IMPACT OF THE TENURE POLICY IN 2007

The Commission continued with the implementation of the policy on limitation of service for Professional and internationally recruited General Service staff. In 2007, 44 positions were affected by the application of the policy. Exceptional extensions were granted to 20 staff members. Four staff members whose employment contracts were not extended were granted consultancy contracts.

Since the implementation of the tenure policy, the PTS has been experiencing a decline in applications for its vacancies, particularly for scientific and technical positions, despite efforts to ensure the widest possible circulation of its vacancy announcements.

In 2007, the Executive Secretary took the decision that staff members who have separated from the PTS can reapply and be considered for vacant positions once they have had a break in service of at least one year.

At the end of 2007, 35 positions affected by normal attrition remained unfilled.

Facilitating the Treaty's Entry into Force

Article XIV of the CTBT concerns the Treaty's entry into force. The article foresees a mechanism of regular conferences to facilitate entry into force (commonly referred to as "Article XIV conferences") if this has not taken place three years after the Treaty is opened for signature. The first Article XIV conference took place in Vienna in 1999. Subsequent conferences were held in New York in 2001 and 2005 and in Vienna in 2003 and 2007.

The Secretary-General of the United Nations convenes the conference at the request of States that have ratified the Treaty. Representatives of ratifying States are invited to participate in deliberations. Signatory States, non-signatory States, international organizations and NGOs are invited to attend as observers.

Article XIV conferences normally discuss and decide by consensus what measures, consistent with international law, may be undertaken to accelerate the ratification process in order to facilitate entry into force.

STATEMENTS MADE AT THE CONFERENCE

- "NAM strongly calls upon all nuclear weapon States as well as all those States that possess nuclear weapons capabilities to observe the spirit and letter of the CTBT." Ambassador Dato' Mohd Arshad M. Hussein, Permanent Representative of Malaysia, on behalf of the Non-Aligned Movement.
- "The EU will continue to work together with all ratifiers to persuade those States that have not yet signed or ratified the Treaty of its essential role in curbing the proliferation of nuclear weapons and advancing nuclear disarmament." Mr João Gomes Cravinho, Secretary of State of Foreign Affairs and Cooperation of Portugal, on behalf of the European Union.
- "As the only nation ever to have suffered nuclear devastation, Japan calls on the international community to ensure that nuclear testing is never carried out by any country ever again." Mr Hitoshi Kimura, Senior Vice-Minister for Foreign Affairs of Japan.

CONDITIONS FOR ENTRY INTO FORCE

The entry into force of the CTBT is conditioned on its ratification by all States listed in Annex 2 to the Treaty. The 44 so-called Annex 2 States are States that participated in the final stage of the negotiations of the Treaty in 1996 and possessed nuclear facilities at that time. Currently, 34 of the 44 States have ratified the Treaty. Of the 10 Annex 2 States that have still to ratify the Treaty, 3 have not yet signed it.

VIENNA, 2007

The Article XIV conference in 2007 took place on 17 and 18 September in the former imperial Hofburg palace in the centre of Vienna. Representatives of 106 States, including 2 non-signatory States, Barbados and Pakistan, participated in this important event. The conference adopted its Final Declaration by consensus – a rare commodity in the contemporary nuclear disarmament and non-proliferation world.

The Foreign Ministers of Austria and Costa Rica, Ms Ursula Plassnik and Mr Bruno Stagno Ugarte.

Seven of the States whose ratification is needed for entry into force but which have yet to ratify the CTBT participated in the conference. Six of these joined ratifying and signatory States in signing the Final Declaration. These were China, Colombia, Egypt, Indonesia, the Islamic Republic of Iran and Israel. Pakistan, a non-signatory and Annex 2 State, spoke at the conference for the first time since 1999.

DECLARATION OF SUPPORT

With the Final Declaration, the conference issued a strong political message in support of the Treaty. The document describes the Treaty's ban on nuclear testing as an "effective measure of nuclear disarmament and non-proliferation in all its aspects". Ratifiers and signatories expressed their concern that the Treaty had not entered into force 11 years after its opening for signature on 24 September 1996. Recent political developments "make entry into force of the Treaty more urgent today than ever before", States said.

States welcomed the significant progress that had been made by securing 15 ratifications and one signature in the two years since the last conference. The Treaty had achieved near universal adherence with the signatures of 177 States and ratifications by 140 of those States. This progress demonstrated "the strong determination of the vast majority of States not to carry out any nuclear weapon test explosion or any other nuclear explosion".

In his message to the conference, the Secretary-General of the United Nations, Mr Ban Ki-moon, appealed especially to those States whose ratification was need-

ed for entry into force to sign and ratify the Treaty. He recalled that "the Treaty would outlaw all nuclear tests and move us towards the larger goals of ridding the world of nuclear weapons and preventing their proliferation".

AUSTRIAN AND COSTA RICAN PRESIDENCY

Austria and Costa Rica served as Presidency of the conference, which was chaired by their respective Foreign Ministers, Ms Ursula Plassnik and Mr Bruno Stagno Ugarte. The shared Presidency is new in the history of the Article XIV conference. This joint endeavour of two States representing two different geographical regions symbolized their shared concern over weapons of mass destruction and their commitment to increasing support worldwide for the CTBT and the Commission.

ADDRESS BY THE EXECUTIVE SECRETARY

In his address to the conference, the Executive Secretary of the CTBTO Preparatory Commission, Mr Tibor Tóth, informed the participants that the build-up of the CTBT verification regime had moved on steadily since the previous Article XIV conference, and with remarkable results. In the two years since the last conference, the number of certified monitoring facilities had increased by 60%. The amount of verification related data sent to States Signatories had doubled, while the overall data volume had tripled.

Speakers at the VERTIC seminar (from left to right): Mr Daryl Kimball, Mr Jaap Ramaker, Mr Anders Persbo and Mr David Hafemeister.

The Executive Secretary recalled that the verification regime had to endure a performance test following the nuclear event in the Democratic People's Republic of Korea in October 2006. This event constituted the most serious trial for the norm against nuclear testing for many years; however, it also constituted a validation of the CTBT global verification system, which proved its value to States Signatories. The Executive Secretary stressed also that, as regrettable and disquieting as the event had been, it had underscored the urgency of bringing the Treaty into force and completing the build-up of the verification system.

REPORT BY THE SPECIAL REPRESENTATIVE

Mr Jaap Ramaker, the Special Representative of the ratifying States to promote the entry into force of the CTBT, reported that in recent years he had visited most of the Annex 2 States that had not ratified in an effort to assist them in ratifying the Treaty. He underlined his conviction in those visits that the world needed a complete ban on nuclear weapon test explosions, and that it needed the CTBT. The Treaty would cap the development of ever more destructive weapons and constituted the last barrier against a nuclear programme turning into a nuclear weapons programme.

SPECIAL EVENT: ACHIEVEMENTS, CHALLENGES AND OPPORTUNITIES FOR THE CTBT

On the margins of the conference, the Verification Research, Training and Information Centre (VERTIC) and the Arms Control Association (ACA) hosted a seminar entitled "The CTBT: Achievements, Challenges and Opportunities". It was moderated by Mr Andreas Persbo of VERTIC and three well known experts participated as panellists: Mr David Hafemeister, Professor at California Polytechnic State University, USA, Mr Daryl Kimball, Executive Director of the ACA, and Mr Jaap Ramaker, Special Representative. The seminar was well attended, with over 120 participants.

APPEAL FROM CIVIL SOCIETY

A total of 17 NGOs attended the conference as observers. Ms Lilly Gundacker of the Women's Federation for World Peace International addressed the conference on behalf of 44 NGOs from around the world. She reminded the participants of the moral dimension of the CTBT, advising the participating States that "your citizens and future generations depend on your wisdom and courage to protect them from the effects of the most dangerous weapons ever to curse humanity." She reiterated that "no government should stand in the way of this indispensable step toward eliminating the threat of nuclear weapons and preventing nuclear war."

Signature and Ratification

STATES WHOSE RATIFICATION IS REQUIRED FOR THE TREATY TO ENTER INTO FORCE (31 DECEMBER 2007)

41 Signed
34 Ratified
3 Not signed

State	Date of Signature	Date of Ratification
Algeria	15 Oct. 1996	11 Jul. 2003
Argentina	24 Sep. 1996	4 Dec. 1998
Australia	24 Sep. 1996	9 Jul. 1998
Austria	24 Sep. 1996	13 Mar. 1998
Bangladesh	24 Oct. 1996	8 Mar. 2000
Belgium	24 Sep. 1996	29 Jun. 1999
Brazil	24 Sep. 1996	24 Jul. 1998
Bulgaria	24 Sep. 1996	29 Sep. 1999
Canada	24 Sep. 1996	18 Dec. 1998
Chile	24 Sep. 1996	12 Jul. 2000
China	24 Sep. 1996	
Colombia	24 Sep. 1996	
Democratic People's Republic of Korea		
Democratic Republic of the Congo	4 Oct. 1996	28 Sep. 2004
Egypt	14 Oct. 1996	
Finland	24 Sep. 1996	15 Jan. 1999
France	24 Sep. 1996	6 Apr. 1998
Germany	24 Sep. 1996	20 Aug. 1998
Hungary	25 Sep. 1996	13 Jul. 1999
India		
Indonesia	24 Sep. 1996	
Iran (Islamic Republic of)	24 Sep. 1996	
Israel	25 Sep. 1996	
Italy	24 Sep. 1996	1 Feb. 1999
Japan	24 Sep. 1996	8 Jul. 1997
Mexico	24 Sep. 1996	5 Oct. 1999
Netherlands	24 Sep. 1996	23 Mar. 1999
Norway	24 Sep. 1996	15 Jul. 1999
Pakistan		
Peru	25 Sep. 1996	12 Nov. 1997
Poland	24 Sep. 1996	25 May 1999
Republic of Korea	24 Sep. 1996	24 Sep. 1999
Romania	24 Sep. 1996	5 Oct. 1999
Russian Federation	24 Sep. 1996	30 Jun. 2000
Slovakia	30 Sep. 1996	3 Mar. 1998
South Africa	24 Sep. 1996	30 Mar. 1999
Spain	24 Sep. 1996	31 Jul. 1998
Sweden	24 Sep. 1996	2 Dec. 1998
Switzerland	24 Sep. 1996	1 Oct. 1999
Turkey	24 Sep. 1996	16 Feb. 2000
Ukraine	27 Sep. 1996	23 Feb. 2001
United Kingdom	24 Sep. 1996	6 Apr. 1998
United States of America	24 Sep. 1996	
Viet Nam	24 Sep. 1996	10 Mar. 2006

Status of Signature and Ratification of the Treaty
(31 December 2007)

States whose ratification is required for the Treaty to enter into force

States Signatories that have ratified

States Signatories yet to ratify

Non-signatory States

STATUS OF SIGNATURE AND RATIFICATION OF THE TREATY (31 DECEMBER 2007)

177 Signed 141 Ratified 18 Not signed

State	Date of Signature	Date of Ratification
Afghanistan	24 Sep. 2003	24 Sep. 2003
Albania	27 Sep. 1996	23 Apr. 2003
Algeria	15 Oct. 1996	11 Jul. 2003
Andorra	24 Sep. 1996	12 Jul. 2006
Angola	27 Sep. 1996	
Antigua and Barbuda	16 Apr. 1997	11 Jan. 2006
Argentina	24 Sep. 1996	4 Dec. 1998
Armenia	1 Oct. 1996	12 Jul. 2006
Australia	24 Sep. 1996	9 Jul. 1998
Austria	24 Sep. 1996	13 Mar. 1998
Azerbaijan	28 Jul. 1997	2 Feb. 1999
Bahamas	4 Feb. 2005	30 Nov. 2007
Bahrain	24 Sep. 1996	12 Apr. 2004
Bangladesh	24 Oct. 1996	8 Mar. 2000
Barbados		
Belarus	24 Sep. 1996	13 Sep. 2000
Belgium	24 Sep. 1996	29 Jun. 1999
Belize	14 Nov. 2001	26 Mar. 2004
Benin	27 Sep. 1996	6 Mar. 2001
Bhutan		
Bolivia	24 Sep. 1996	4 Oct. 1999
Bosnia and Herzegovina	24 Sep. 1996	26 Oct. 2006
Botswana	16 Sep. 2002	28 Oct. 2002
Brazil	24 Sep. 1996	24 Jul. 1998
Brunei Darussalam	22 Jan. 1997	
Bulgaria	24 Sep. 1996	29 Sep. 1999
Burkina Faso	27 Sep. 1996	17 Apr. 2002
Burundi	24 Sep. 1996	
Cambodia	26 Sep. 1996	10 Nov. 2000
Cameroon	16 Nov. 2001	6 Feb. 2006
Canada	24 Sep. 1996	18 Dec. 1998
Cape Verde	1 Oct. 1996	1 Mar. 2006
Central African Republic	19 Dec. 2001	
Chad	8 Oct. 1996	
Chile	24 Sep. 1996	12 Jul. 2000
China	24 Sep. 1996	
Colombia	24 Sep. 1996	
Comoros	12 Dec. 1996	
Congo	11 Feb. 1997	
Cook Islands	5 Dec. 1997	6 Sep. 2005
Costa Rica	24 Sep. 1996	25 Sep. 2001
Côte d'Ivoire	25 Sep. 1996	11 Mar. 2003
Croatia	24 Sep. 1996	2 Mar. 2001
Cuba		
Cyprus	24 Sep. 1996	18 Jul. 2003
Czech Republic	12 Nov. 1996	11 Sep. 1997
Democratic People's Republic of Korea		
Democratic Republic of the Congo	4 Oct. 1996	28 Sep. 2004
Denmark	24 Sep. 1996	21 Dec. 1998

State	Date of Signature	Date of Ratification
Djibouti	21 Oct. 1996	15 Jul. 2005
Dominica		
Dominican Republic	3 Oct. 1996	4 Sep. 2007
Ecuador	24 Sep. 1996	12 Nov. 2001
Egypt	14 Oct. 1996	
El Salvador	24 Sep. 1996	11 Sep. 1998
Equatorial Guinea	9 Oct. 1996	
Eritrea	11 Nov. 2003	11 Nov. 2003
Estonia	20 Nov. 1996	13 Aug. 1999
Ethiopia	25 Sep. 1996	8 Aug. 2006
Fiji	24 Sep. 1996	10 Oct. 1996
Finland	24 Sep. 1996	15 Jan. 1999
France	24 Sep. 1996	6 Apr. 1998
Gabon	7 Oct. 1996	20 Sep. 2000
Gambia	9 Apr. 2003	
Georgia	24 Sep. 1996	27 Sep. 2002
Germany	24 Sep. 1996	20 Aug. 1998
Ghana	3 Oct. 1996	
Greece	24 Sep. 1996	21 Apr. 1999
Grenada	10 Oct. 1996	19 Aug. 1998
Guatemala	20 Sep. 1999	
Guinea	3 Oct. 1996	
Guinea-Bissau	11 Apr. 1997	
Guyana	7 Sep. 2000	7 Mar. 2001
Haiti	24 Sep. 1996	1 Dec. 2005
Holy See	24 Sep. 1996	18 Jul. 2001
Honduras	25 Sep. 1996	30 Oct. 2003
Hungary	25 Sep. 1996	13 Jul. 1999
Iceland	24 Sep. 1996	26 Jun. 2000
India		
Indonesia	24 Sep. 1996	
Iran (Islamic Republic of)	24 Sep. 1996	
Iraq		
Ireland	24 Sep. 1996	15 Jul. 1999
Israel	25 Sep. 1996	
Italy	24 Sep. 1996	1 Feb. 1999
Jamaica	11 Nov. 1996	13 Nov. 2001
Japan	24 Sep. 1996	8 Jul. 1997
Jordan	26 Sep. 1996	25 Aug. 1998
Kazakhstan	30 Sep. 1996	14 May 2002
Kenya	14 Nov. 1996	30 Nov. 2000
Kiribati	7 Sep. 2000	7 Sep. 2000
Kuwait	24 Sep. 1996	6 May 2003
Kyrgyzstan	8 Oct. 1996	2 Oct. 2003
Lao People's Democratic Republic	30 Jul. 1997	5 Oct. 2000
Latvia	24 Sep. 1996	20 Nov. 2001
Lebanon	16 Sep. 2005	
Lesotho	30 Sep. 1996	14 Sep. 1999
Liberia	1 Oct. 1996	
Libyan Arab Jamahiriya	13 Nov. 2001	6 Jan. 2004

State	Date of Signature	Date of Ratification
Liechtenstein	27 Sep. 1996	21 Sep. 2004
Lithuania	7 Oct. 1996	7 Feb. 2000
Luxembourg	24 Sep. 1996	26 May 1999
Madagascar	9 Oct. 1996	15 Sep. 2005
Malawi	9 Oct. 1996	
Malaysia	23 Jul. 1998	
Maldives	1 Oct. 1997	7 Sep. 2000
Mali	18 Feb. 1997	4 Aug. 1999
Malta	24 Sep. 1996	23 Jul. 2001
Marshall Islands	24 Sep. 1996	
Mauritania	24 Sep. 1996	30 Apr. 2003
Mauritius		
Mexico	24 Sep. 1996	5 Oct. 1999
Micronesia (Federated States of)	24 Sep. 1996	25 Jul. 1997
Moldova	24 Sep. 1997	16 Jan. 2007
Monaco	1 Oct. 1996	18 Dec. 1998
Mongolia	1 Oct. 1996	8 Aug. 1997
Montenegro	23 Oct. 2006	23 Oct. 2006
Morocco	24 Sep. 1996	17 Apr. 2000
Mozambique	26 Sep. 1996	
Myanmar	25 Nov. 1996	
Namibia	24 Sep. 1996	29 Jun. 2001
Nauru	8 Sep. 2000	12 Nov. 2001
Nepal	8 Oct. 1996	
Netherlands	24 Sep. 1996	23 Mar. 1999
New Zealand	27 Sep. 1996	19 Mar. 1999
Nicaragua	24 Sep. 1996	5 Dec. 2000
Niger	3 Oct. 1996	9 Sep. 2002
Nigeria	8 Sep. 2000	27 Sep. 2001
Niue		
Norway	24 Sep. 1996	15 Jul. 1999
Oman	23 Sep. 1999	13 Jun. 2003
Pakistan		
Palau	12 Aug. 2003	1 Aug. 2007
Panama	24 Sep. 1996	23 Mar. 1999
Papua New Guinea	25 Sep. 1996	
Paraguay	25 Sep. 1996	4 Oct. 2001
Peru	25 Sep. 1996	12 Nov. 1997
Philippines	24 Sep. 1996	23 Feb. 2001
Poland	24 Sep. 1996	25 May 1999
Portugal	24 Sep. 1996	26 Jun. 2000
Qatar	24 Sep. 1996	3 Mar. 1997
Republic of Korea	24 Sep. 1996	24 Sep. 1999
Romania	24 Sep. 1996	5 Oct. 1999
Russian Federation	24 Sep. 1996	30 Jun. 2000
Rwanda	30 Nov. 2004	30 Nov. 2004
Saint Kitts and Nevis	23 Mar. 2004	27 Apr. 2005
Saint Lucia	4 Oct. 1996	5 Apr. 2001
Saint Vincent and the Grenadines		

State	Date of Signature	Date of Ratification
Samoa	9 Oct. 1996	27 Sep. 2002
San Marino	7 Oct. 1996	12 Mar. 2002
Sao Tome and Principe	26 Sep. 1996	
Saudi Arabia		
Senegal	26 Sep. 1996	9 Jun. 1999
Serbia	8 Jun. 2001	19 May 2004
Seychelles	24 Sep. 1996	13 Apr. 2004
Sierra Leone	8 Sep. 2000	17 Sep. 2001
Singapore	14 Jan. 1999	10 Nov. 2001
Slovakia	30 Sep. 1996	3 Mar. 1998
Slovenia	24 Sep. 1996	31 Aug. 1999
Solomon Islands	3 Oct. 1996	
Somalia		
South Africa	24 Sep. 1996	30 Mar. 1999
Spain	24 Sep. 1996	31 Jul. 1998
Sri Lanka	24 Oct. 1996	
Sudan	10 Jun. 2004	10 Jun. 2004
Suriname	14 Jan. 1997	7 Feb. 2006
Swaziland	24 Sep. 1996	
Sweden	24 Sep. 1996	2 Dec. 1998
Switzerland	24 Sep. 1996	1 Oct. 1999
Syrian Arab Republic		
Tajikistan	7 Oct. 1996	10 Jun. 1998
Thailand	12 Nov. 1996	
The former Yugoslav Republic of Macedonia	29 Oct. 1998	14 Mar. 2000
Timor-Leste		
Togo	2 Oct. 1996	2 Jul. 2004
Tonga		
Trinidad and Tobago		
Tunisia	16 Oct. 1996	23 Sep. 2004
Turkey	24 Sep. 1996	16 Feb. 2000
Turkmenistan	24 Sep. 1996	20 Feb. 1998
Tuvalu		
Uganda	7 Nov. 1996	14 Mar. 2001
Ukraine	27 Sep. 1996	23 Feb. 2001
United Arab Emirates	25 Sep. 1996	18 Sep. 2000
United Kingdom	24 Sep. 1996	6 Apr. 1998
United Republic of Tanzania	30 Sep. 2004	30 Sep. 2004
United States of America	24 Sep. 1996	
Uruguay	24 Sep. 1996	21 Sep. 2001
Uzbekistan	3 Oct. 1996	29 May 1997
Vanuatu	24 Sep. 1996	16 Sep. 2005
Venezuela (Bolivarian Republic of)	3 Oct. 1996	13 May 2002
Viet Nam	24 Sep. 1996	10 Mar. 2006
Yemen	30 Sep. 1996	
Zambia	3 Dec. 1996	23 Feb. 2006
Zimbabwe	13 Oct. 1999	

Facilities of the CTBT International Monitoring System

The map on the back cover shows the approximate locations of IMS facilities based on information in Annex 1 to the Protocol to the Treaty adjusted, as appropriate, in accordance with proposed alternative locations that have been approved by the Preparatory Commission for reporting to the initial session of the Conference of the States Parties following entry into force of the Treaty.

PS Primary seismic array station
PS Primary seismic three component station
Total: 50 primary seismic stations
(PS20: details to be determined)

AS Auxiliary seismic array station
AS Auxiliary seismic three component station
Total: 120 auxiliary seismic stations
(AS39: details to be determined)

HA Hydroacoustic (T phase) station
HA Hydroacoustic (hydrophone) station
Total: 11 hydroacoustic stations

IS Infrasound station
Total: 60 infrasound stations
(IS28: details to be determined)

RN Radionuclide station
Total: 80 radionuclide stations
(RN35: details to be determined)

RL Radionuclide laboratory
Total: 16 radionuclide laboratories

Facilities of the CTBT International Monitoring System