CTBTO
PREPARATORY COMMISSION

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

Annual Report 2002

www.ctbto.org

CTBTO
PREPARATORY COMMISSION

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

Annual Report 2002

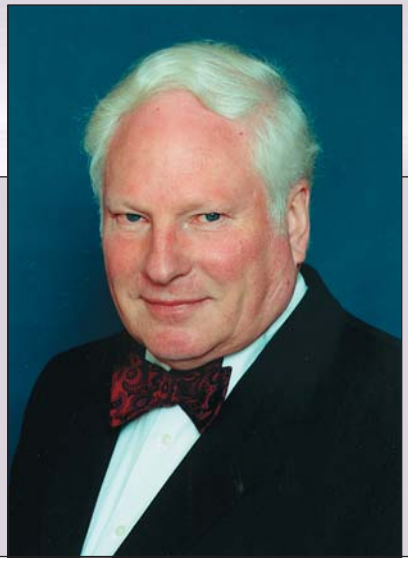
ARTICLE I
of the Treaty

Basic Obligations

1. Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control.

2. Each State Party undertakes, furthermore, to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion.

This report serves as the first of the Executive Secretary's written reports to the Twentieth Session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization. It gives an account as of 31 December 2002 of the activities undertaken by the Provisional Technical Secretariat of the Commission during 2002 in implementation of Major Programmes 1–7.



Foreword
by the Executive Secretary

It is a great pleasure for me to submit herewith the annual report of the Provisional Technical Secretariat (PTS) of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization for 2002, which shows tangible progress made in all aspects of establishing the Treaty verification regime and preparing for the entry into force of the Treaty.

The establishment of the International Monitoring System (IMS), which consists of a worldwide network of 321 seismic, hydroacoustic, infrasound and radionuclide stations and 16 radionuclide laboratories, continues to be developed steadily and securely. During 2002, 23 additional stations were certified as meeting the technical requirements of the Commission, bringing the total number of certified facilities at the end of 2002 to 47. Thus at the end of 2002, 46% of the stations in the IMS, including two Antarctic stations, were completed and met or substantially met the Commission's specifications. Since the beginning of 2003, 3 additional stations have been certified, bringing the total to 50 certified facilities. A further 80 stations are under construction or in the stage of contract negotiation.

The International Data Centre (IDC) in Vienna continues to receive, store and distribute data from a growing number of IMS stations. It routinely analyses data and provides bulletins to States Signatories on a regular basis. It also continues to be engaged in development and testing of additional processing capabilities required at entry into force of the Treaty. On the part of States Signatories, thus far around 50 National Data Centres (NDCs) have been established and a total of 465 users from 66 countries have been nominated to access IMS data and IDC products. We will continue to assist States Signatories in establishing and operating their NDCs.

The year 2002 was also the year in which the first large scale field experiment in on-site inspection (OSI) was conducted. More than 25 surrogate inspectors, from 17 States Signatories and the PTS staff, performed a simulation of inspection activities, including helicopter overflight, in a remote part of Kazakhstan. The results of the experiment will greatly help to build up the OSI regime.

During 2002, experts from all over the world continued to study and discuss the Treaty verification regime. Activities organized by the Commission, such as training courses and workshops, were held not only in Vienna but also in Africa, North and Central America, Asia and elsewhere in Europe, and more than 400 persons attended. I am grateful to Canada, China, Finland, Jamaica, Kenya, Norway, the United Kingdom and the United States of America for successfully hosting these events to meet the great interest of CTBT experts throughout the world.

While the primary purpose of the verification regime is to ensure compliance with the Treaty, the verification technologies are also useful for civil and scientific purposes. Scientific communities are expressing great interest in IMS data and IDC products, which could be of significant value for a variety of studies and would benefit not only individual States but also humankind as a whole. During the year, two events focusing on the promotion of civil and scientific applications of the verification technologies were organized upon the initiative and with the assistance of the Governments of Australia, Japan, the Netherlands and the United Kingdom. The PTS would be pleased to continue to support this endeavour.

On 11 June 2002, the Commission acceded to the 1986 Vienna Convention on the Law of Treaties between States and International Organizations or between International Organizations. I am confident that this will promote clarity, predictability and stability in the legal relations involving the Commission, and am pleased that the recognition of the status of the Commission has been further enhanced and broadened. On 18 September 2002, I signed the relationship agreement between the Commission and the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL). With the conclusion of this agreement, the cooperation between the Commission and OPANAL, which share the objective of enhancing international peace and security, has been strengthened.

Since the end of 2002, we have had ratification by an additional State. As of 11 March 2003, the CTBT had 166 signatures and 98 ratifications. Thus the Treaty is obtaining the status of universality. Recently States decided to convene the next Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty (Article XIV conference) from 3 to 5 September this year in Austria. I hope that entry into force of the CTBT will be promoted further on the occasion of the conference. The PTS, for its part, will continue to advance in its work with strong determination in 2003.

Wolfgang Hoffmann
Executive Secretary

Preparatory Commission
for the Comprehensive
Nuclear-Test-Ban Treaty
Organization

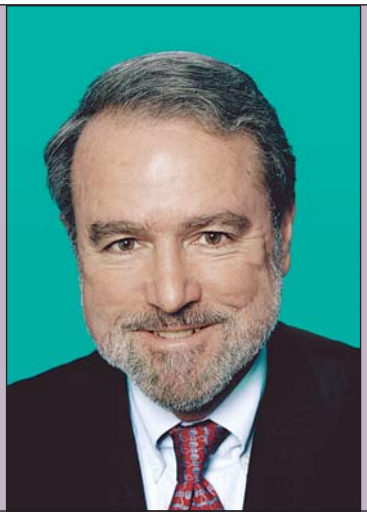
Vienna
March 2003

Directors of the Provisional Technical Secretariat

Mr Gerardo Suárez
International Monitoring System Division

Mr Rashad Kebeasy
International Data Centre Division

Mr Vladimir Krioutchenkov
On-Site Inspection Division



Mr Pierce S. Corden
Division of Administration

Mr Ziping Gu
Legal and External Relations Division

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

Cover: Bottom left: inlet ports of wind noise reducing pipe array
at infrasound station IS33, Antananarivo, Madagascar.
Top right: part of Global Communications Infrastructure hub at Fucino, Italy.

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
May 2003
Based on document CTBT/PC-20/INF.1,
Report of the Executive Secretary on Major Programmes 1–7 for 2002

Contents

Abbreviations

ATM . . . . . atmospheric transport modelling
CIF . . . . . Capital Investment Fund
DMS . . . . . Document Management System
DNS . . . . . domain name system
DOTS . . . . . Database of the (Provisional) Technical Secretariat
EAC . . . . . Experimental Advanced Course
FE02 . . . . . OSI field experiment in 2002
GCI . . . . . Global Communications Infrastructure
GSETT-3 . . . . . Group of Scientific Experts Third Technical Test
HS . . . . . health and safety
IDC . . . . . International Data Centre (Vienna)
IDRT . . . . . initial draft rolling text
IMS . . . . . International Monitoring System
IT . . . . . inspection team
LRP . . . . . Long Range Plan
NDC . . . . . National Data Centre
NMS . . . . . .network management system
O&M . . . . . operation and maintenance
OPANAL . . . . . Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean
OSC . . . . . Operations Support Centre
OSI . . . . . on-site inspection
PKI . . . . . Public Key Infrastructure
PMO . . . . . Policy Making Organ
PTS . . . . . Provisional Technical Secretariat
QA . . . . . quality assurance
REB . . . . . Reviewed Event Bulletin
SAMS . . . . . Seismic Aftershock Monitoring System
TEP . . . . . training and exercise programme
TTP . . . . . technical training programme
VIC . . . . . Vienna International Centre
VPN . . . . . .virtual private network
VSAT . . . . . very small aperture terminal
WGA . . . . . Working Group A
WGB . . . . . Working Group B
WMO . . . . . World Meteorological Organization

MAJOR PROGRAMME 1

International Monitoring System

Major Programme 1:
International Monitoring System

The year 2002 saw significant advancement in the establishment of the International Monitoring System (IMS). Progress was made on all aspects of installing monitoring stations in all four technologies (seismic, infrasound, hydroacoustic and radionuclide). Installations were completed at 39 additional stations; 23 more stations, including the first of the auxiliary seismic stations, were certified as meeting the technical requirements of the Preparatory Commission, bringing the total number of certified facilities to 47. This includes one of the radionuclide laboratories designated in Annex 1 to the Protocol to the Treaty. Many more stations are now complete and moving through testing and evaluation, the final phase before certification. With these stations added to those already certified, by the end of the year 46% of the stations in the IMS were completed and met or substantially met specifications.

The number of site surveys completed during 2002 declined because this phase is nearing completion; site surveys have now been completed at 88% of the 321 sites.

Considerable effort was devoted during the year to the further development of procedures for provisional operation and maintenance (O&M) of certified stations for testing and evaluation purposes.

IMS ESTABLISHMENT

A summary of the status of the establishment of the IMS in each of the monitoring technologies, giving the main highlights for 2002, is presented below. The status of the site survey and station installation programmes at the end of 2002 is provided in Tables 1 and 2. The site survey programme determines whether station locations given in the Treaty are suitable, and establishes vital information required in order to construct the stations. The installation programme encompasses site preparation, equipment purchase, installation and testing and evaluation, leading to certification that the station meets the technical requirements of the Commission.

Table 1. Status of the Site Survey Programme as of 31 December 2002

IMS Station Type	Complete/ Not Required	Under Way	Contract Pending	Not Started
Primary seismic	45	0	1	4
Auxiliary seismic	116	2	1	1
Infrasound	48	3	2	7
Hydroacoustic	11	0	0	0
Radionuclide	64	4	3	9

Table 2. Status of the Station Installation Programme as of 31 December 2002

IMS Station Type	Complete/ Substantially Meets Specifications	Under Way	Contract Pending	Not Started
Primary seismic	30	11	3	6
Auxiliary seismic	79	17	0	24
Infrasound	16	12	8	24
Hydroacoustic	3	7	0	1
Radionuclide	22	12	10	36

Seismological Monitoring System

During 2002, in the primary seismic monitoring programme, site preparation and installation were completed for 11 stations and 5 stations were certified, bringing the total to 16. Site preparation and/or installation was proceeding for 15 stations, under contract to the Provisional Technical Secretariat (PTS), under conditions of reduced assessment (whereby a State Signatory undertakes work with national fund-

Primary seismic station PS25, Songino, Mongolia.

Auxiliary seismic station AS1, Coronel Fontana, Argentina.

Primary seismic station PS4, Stephens Creek, Australia.

Auxiliary seismic station AS69, Rata Peaks, New Zealand.

ing that is later deducted from that State's assessed contribution for the year after the station is certified) or by means of gifted national funding through bilateral agreements. A primary seismic station in the Russian Federation that was due to be upgraded was destroyed by a landslide in the latter part of 2002, and a new site will need to be found.

In the auxiliary seismic monitoring programme, three site surveys were under way. Ten stations had installations completed and were connected to the International Data Centre (IDC), either under contract to the PTS or through national funding, and the first six auxiliary stations were certified. Site preparation and/or installation was in progress for 17 auxiliary stations.

Infrasound Monitoring System

In the infrasound monitoring programme, two new site surveys were completed. Five new stations began sending data to Vienna and six stations were certified, bringing the total number of certified stations to 10. Site preparation and/or installation was under way for 13 stations, including the second infrasound station in Antarctica. Construction at this remote site is expected to be completed by February 2003.

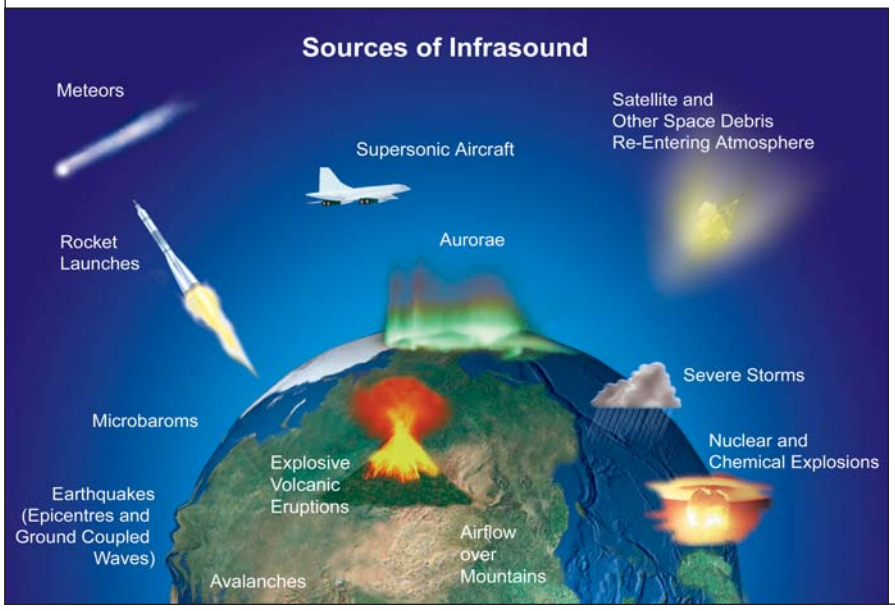
1. Aerial view of one element of infrasound station IS17, Dimbokro, Côte d'Ivoire, certified in December 2002.

2. Certification visit to infrasound station IS18, Qaanaaq, Greenland (Denmark), October 2002.

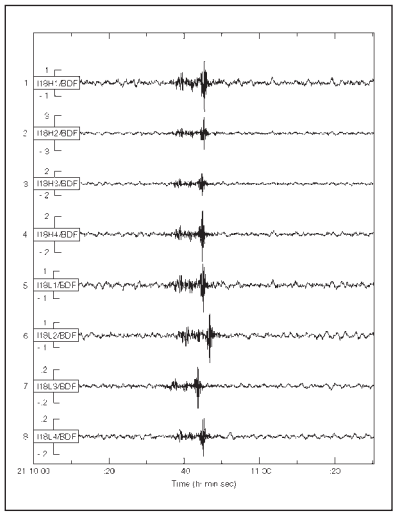
3. Record of ice breaking during the certification visit to IS18.

1

2



3



The PTS and the Atomic Energy Commission of France have agreed to collaborate on the design and testing of an effective noise reducing system for use at infrasound stations located in high wind environments. Work on this project will begin in early 2003.

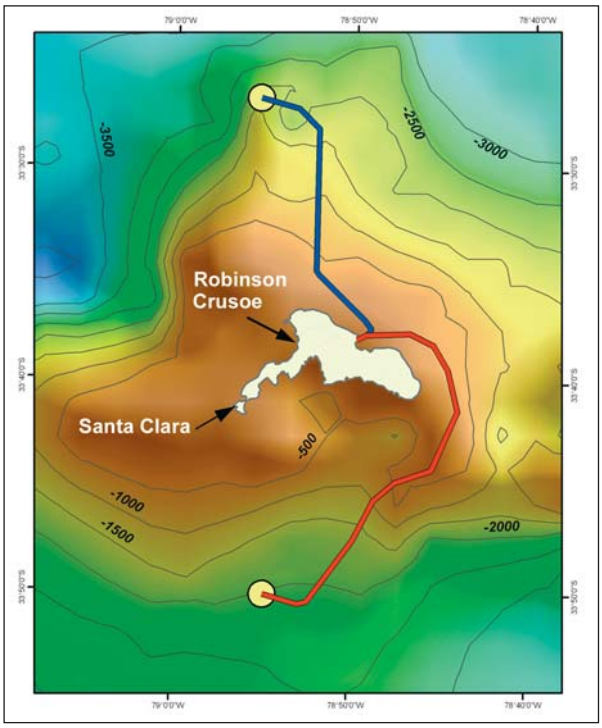
In September 2002, an infrasound technology workshop was held in De Bilt, Netherlands. Discussions focused on the design and construction of infrasound stations and on the processing of infrasound data.

Hydroacoustic Monitoring System

The hydroacoustic monitoring programme achieved steady progress in all aspects. Perhaps the most singular achievement was the completion of the site survey programme for all 11 hydroacoustic stations. Work included the development, manufacture and testing of two hydrophone based hydroacoustic stations. This work, which had been started prior to 2002, has prepared these two stations for installation during the first quarter of 2003. Work on a third hydrophone based station has been advanced by a national contribution, including equipment purchase and shore facility construction. The PTS will continue work on this station during 2003.

1

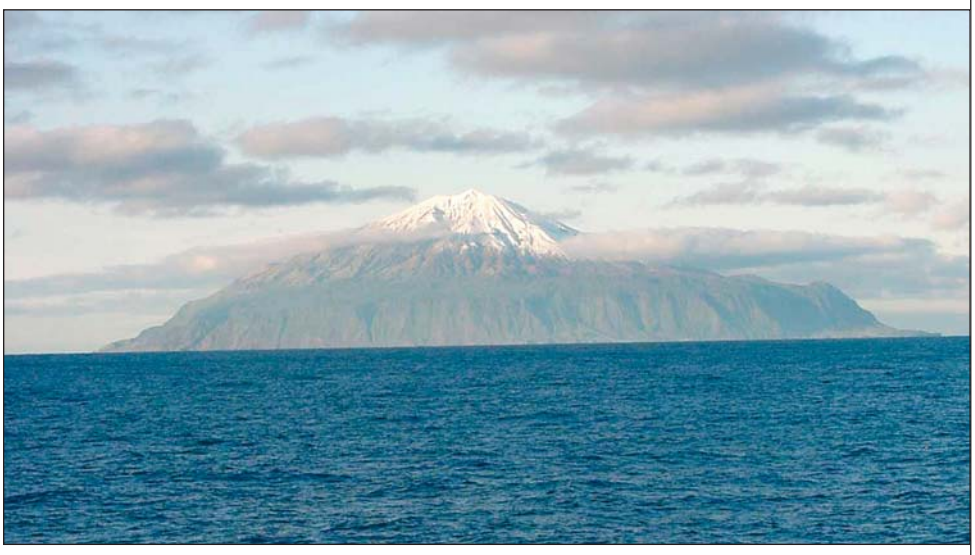
2



1. Solar panels, battery packs and satellite dish at the southern element of HA5, Guadeloupe (France), the first T phase hydroacoustic station to be certified (January 2002).

2. Diagram of underwater cables and hydrophones at hydroacoustic station HA3, in the Juan Fernández Islands (Chile). The cables come ashore at Robinson Crusoe Island.

3. Hydroacoustic station HA9 will be located on the island of Tristan da Cunha (United Kingdom), the remotest inhabited place in the world.



3

There was also considerable progress on the T phase stations of the hydroacoustic network. At the beginning of 2002, the first T phase station was certified. By the end of the year, equipment and installation contracts were in place, or were in the procurement process, for all of the four remaining T phase stations. Installation work at all four stations is scheduled for 2003.

Radionuclide Monitoring System

Two types of radionuclide station make up the radionuclide network – particulate and noble gas. Particulate stations can be manually operated or automatic. In addition, Annex 1 to the Protocol to the Treaty designates 16 radionuclide laboratories.

Ten particulate stations were completed and six were certified, of which four were manual stations and two were automatic. At the end of the year, the construction of 20 additional particulate stations was in progress. Four certification visits to stations were made towards the end of the year and certification of these stations is expected during the first quarter of 2003.

Tests of the manual particulate air sampler were completed in a climatic wind tunnel facility, using a modified air inlet designed for polar conditions. The next task will be to install and test the new design at a station with polar conditions. The assessment of the global collection efficiency of air sampling systems was completed, and recommendations on the design to improve collection efficiency are being considered.

The laboratory proficiency test exercise involving all 16 designated radionuclide laboratories was completed, and results will be used to assess the quality of radioanalytical measurements currently made by the laboratories. In September 2002, a laboratory workshop was held in Blumau, Austria. Discussions focused on the proficiency test programme, certification issues, software applications and the laboratories' future involvement in noble gas measurements and, possibly, on-site inspection (OSI) sample analysis.

Phase III of the noble gas experiment began with the installation of noble gas systems in Tahiti, Norway and China. The fourth system will be installed in Brazil during the first quarter of 2003. Tests of a fifth system are under way in Canada and a sixth system is planned for installation in Germany. Noble gas workshops were held in January 2002 in Tahiti and in September 2002 in the United States of America. Discussions at these workshops focused on Phase III, field operation of the systems, remote monitoring of the systems by the PTS and the future role of radionuclide laboratories within the noble gas network.

Radionuclide station RN51, Kavieng, New Ireland, Papua New Guinea, during a certification visit.

Measurement of airflow through the manual particulate air sampler at radionuclide station RN45, Ulaanbaatar, Mongolia.

Automatic particulate air sampler (RASA) installed at radionuclide station RN11, Rio de Janeiro, Brazil.

Radionuclide station RN18, Punta Arenas, Chile.

PROVISIONAL OPERATION AND MAINTENANCE OF IMS STATIONS

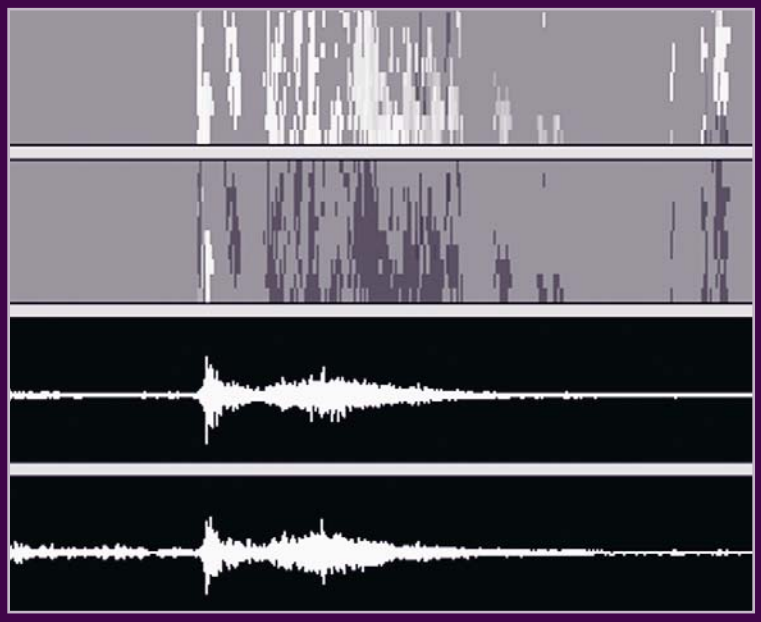
The Nineteenth Session of the Commission in November 2002 provided guidelines to the PTS on the technical testing and provisional O&M of certified IMS stations, the Global Communications Infrastructure (GCI) and the IDC during 2003 and 2004. The guidelines include a temporary relaxation of the station performance requirements. This is expected to result in lower costs in testing and provisionally operating and maintaining stations during these years. The PTS began a thorough review of O&M costs and will keep them as low as possible, while ensuring that the investment made by the Commission is protected and the equipment and personnel are utilized effectively.

The implementation of provisional O&M activities is a complex process involving many tasks of both a technical and an administrative nature. These are carried out by many parts of the PTS working closely together. Coordination was strengthened and is managed by an integrated group that meets weekly. In addition, a new model O&M contract that simplifies the contracting procedures was developed. A request for proposals was prepared to undertake the first stage of development of an integrated logistics support system for the IMS. A contract was signed for development and documentation of O&M procedures. The first release of the Database of the (Provisional) Technical Secretariat (DOTS), related to the management of the IMS network configuration, was launched in December 2002. It includes modules for recording information on States and stations, IMS equipment and points of contact. DOTS is now being populated with information on the certified stations.

A full technical training programme (TTP) for IMS station operators was held in April 2002, with the first part in Vienna and the second part in various institutions in Finland, France and the USA, depending on the technology. In June 2002, for the first time, a full TTP was hosted by a State Signatory – China. The first part was held in Beijing, and the second part took advantage of new IMS stations – the primary seismic station in Hailar and the radionuclide station in Guangzhou. A third reduced TTP with only radionuclide training components was conducted in November 2002 in Finland and the USA. In addition to these TTPs, two training sessions for seismic station operators took place in May and October 2002 at the premises of the seismic equipment supplier in Canada. In total, 83 station operators from 58 IMS facilities attended one or another form of IMS training.

FOLLOW-UP TO EXTERNAL EVALUATION OF THE IMS MAJOR PROGRAMME

Following an external evaluation of the IMS Major Programme carried out in Vienna in November 2001, the report of the evaluating team was examined during each of the three Working Group B (WGB) sessions in 2002 and the PTS reported on its implementation of the team's recommendations. By the end of the year, action had been taken on all of the recommendations that were within the power of the PTS to implement. WGB expressed its satisfaction with these actions and concluded its consideration of the report of the evaluation.



MAJOR PROGRAMME 2

International Data Centre

Major Programme 2:
International Data Centre

The PTS continued the build-up of the IDC according to the plan described under Subphase 5a of the seven phase Progressive Commissioning Plan. This subphase comprises the preparation for full scale testing of the IDC. Release 3 upgrade software was installed; data from 71 waveform monitoring stations, including 12 new or upgraded IMS stations admitted to operations during the year, were processed continuously to produce Reviewed Event Bulletins (REBs); the number of radionuclide stations in IDC operations rose by 6 to 15, with data processed continuously for radioactivity report production; developments continued in automatic processing and calibration; and atmospheric transport modelling (ATM) development advanced through implementation of software modules and interaction with an external data provider and the World Meteorological Organization (WMO).

Testing and evaluation of software were afforded higher priority following agreement by the Commission to relax the time schedule for production of monitoring products. Staff resources were reallocated within all technology groups in response to the need for greater emphasis on development, testing and evaluation.

An information technology strategy was developed for the PTS, targeting mainly the optimization of acquisition and processing of IMS data, and the sharing of information.

MANAGEMENT, COORDINATION AND TRAINING

IDC Restructuring

The structure of the IDC was reorganized to improve operational efficiency in the radionuclide and waveform monitoring and development areas, and in the delivery of services to States Signatories. To respond to the increasing breadth and complexity of work in the monitoring, development and service delivery areas, the former Monitoring Section and Scientific Methods and Data Fusion Section were replaced by four new Sections: the Waveform Monitoring Section comprising the Waveform Data Processing Unit and two Waveform Analysis Units; the Services, Review and Training Section comprising the Services and Training Unit and the Review and Fusion Unit; the Radionuclide Section comprising the Radionuclide Monitoring Unit and the Radionuclide Development Unit; and the Waveform Development and Software Integration Section comprising the Waveform Development Unit and the Software Integration Unit. This new structure provides greater focus on technology-specific tasks with improved results in efficiency and output, as well as providing staff at lower professional levels the opportunity to exercise appropriate managerial responsibility. All changes were implemented within existing staff resources.

Technical Coordination

IDC participation in O&M coordination meetings facilitated the development of cooperation and mutual understanding in routine station operation.

The PTS provided various forms of assistance to States Signatories in their build-up of national data handling and analytical capabilities, utilizing experience gained by PTS staff from visits to States Signatories or participation in regional technical and international cooperation workshops.

Services related to the administration, maintenance and operation of the computer infrastructure for the entire PTS were provided by the IDC, together with

advancement in the area of security through the establishment of the Computer Security Control Committee and further work on the Public Key Infrastructure (PKI).

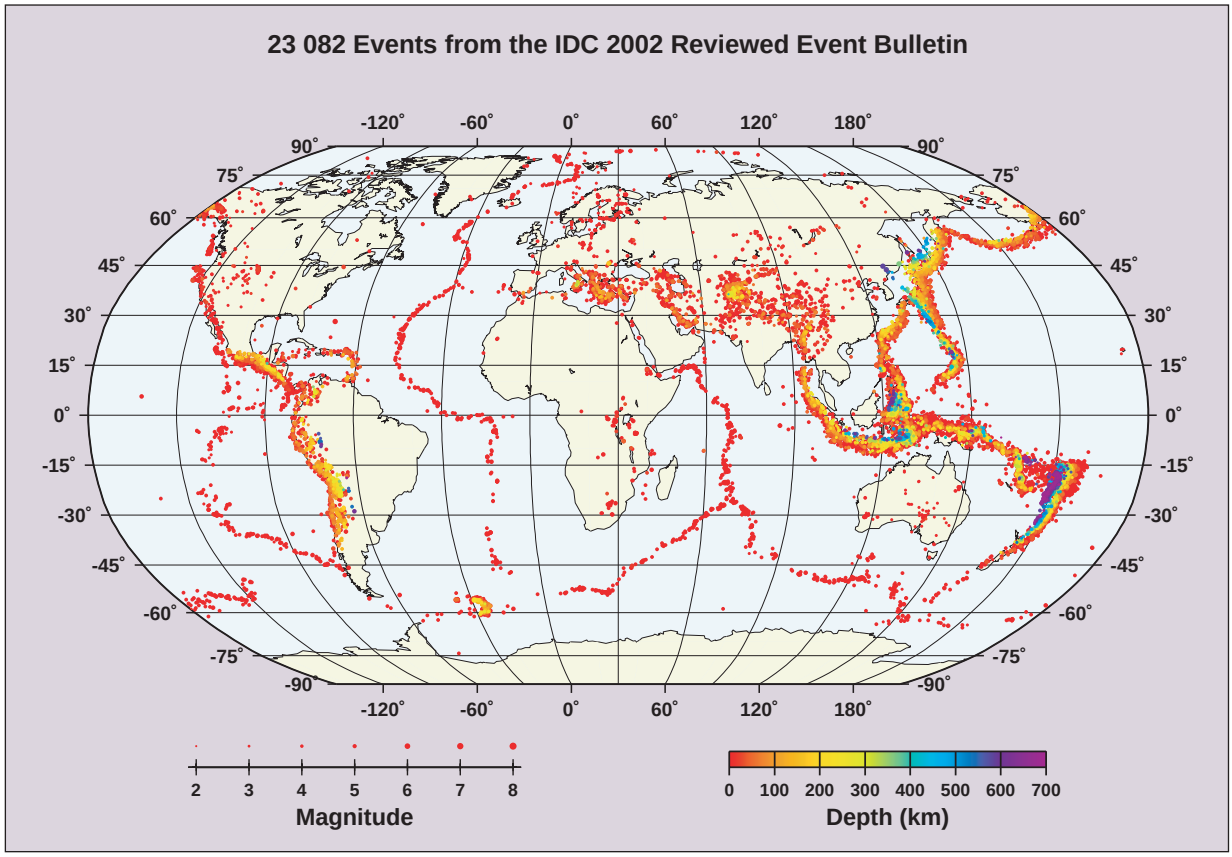
Information Security

The comprehensive information security assessment for electronic information held in systems operated by the IDC was completed and presented to WGB. This was followed by the presentation to States Signatories of a strategy to improve electronic information security within the PTS where needed, and the drafting of a 'road map' for implementing the strategy. The road map, which is under consideration by WGB, describes and prioritizes the information security improvement initiatives proposed for future years. This electronic information security activity also forms part of an ongoing PTS project to consolidate policies and procedures for the handling and protection of information.

Training

The objectives of IDC training courses for analysts are to increase the number and geographical distribution of possible candidates for analyst posts in the IDC, and to increase the understanding of IDC operations for possible application in National Data Centres (NDCs) of States Signatories. Six candidates were selected for the seventh course, held from 1 March to 31 July 2002. One of the trainees was subsequently hired by the PTS.

Training courses for NDCs are intended to provide information necessary for States Signatories to take greater advantage of the data, products and services of the IDC. Eleven persons from 11 States Signatories participated in the Fourth IDC Training Course for NDC Technical Staff, held from 18 to 29 November 2002. The Fourth IDC Training Course for NDC Managers, which was scheduled for 14–18 October 2002, was cancelled owing to budgetary constraints.



MONITORING

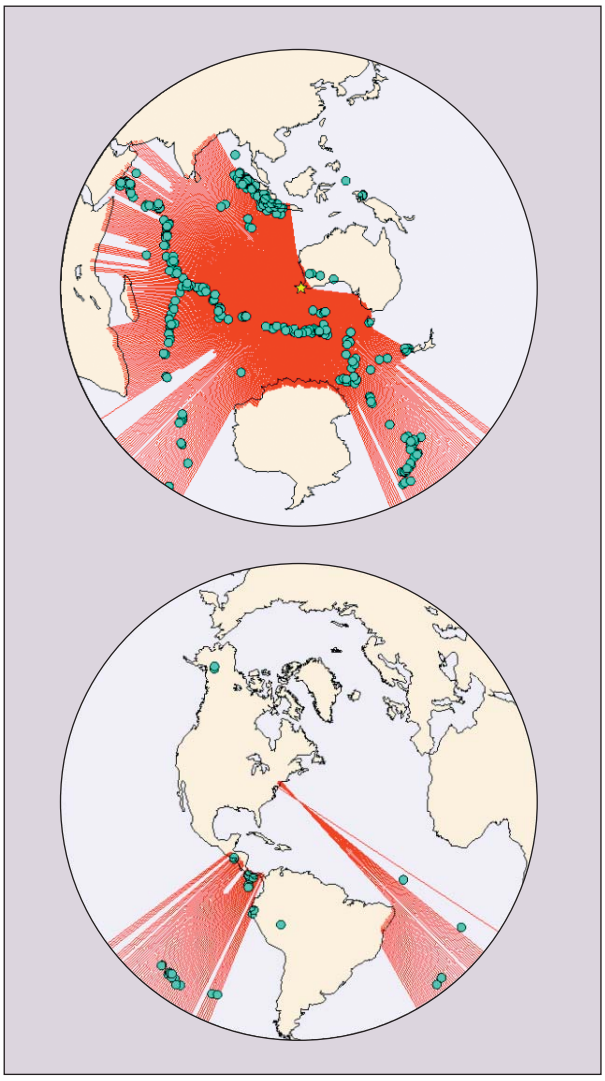
Waveform Data Processing and Analysis

Testing of Release 3 operational software continued under near operational conditions with the participation of States Signatories. Standard products, including REBs, were issued for seven data days per week. A more flexible REB schedule was introduced to meet requirements for greater emphasis on development and testing, and on continued training of analyst staff, especially in hydroacoustic and infrasound processing. On average 151 and 64 events per day were compiled within the automatic Standard Event List 1 and the REB, respectively, compared with 153 and 61 in 2001.

During 2002, all three waveform technologies contributed data for the first time towards the detection of a single event – on 10 October an earthquake of magnitude 7.3 in Indonesia was detected by 50 IMS stations, including 4 hydroacoustic stations and 1 infrasound station.

Radionuclide Data Processing and Analysis

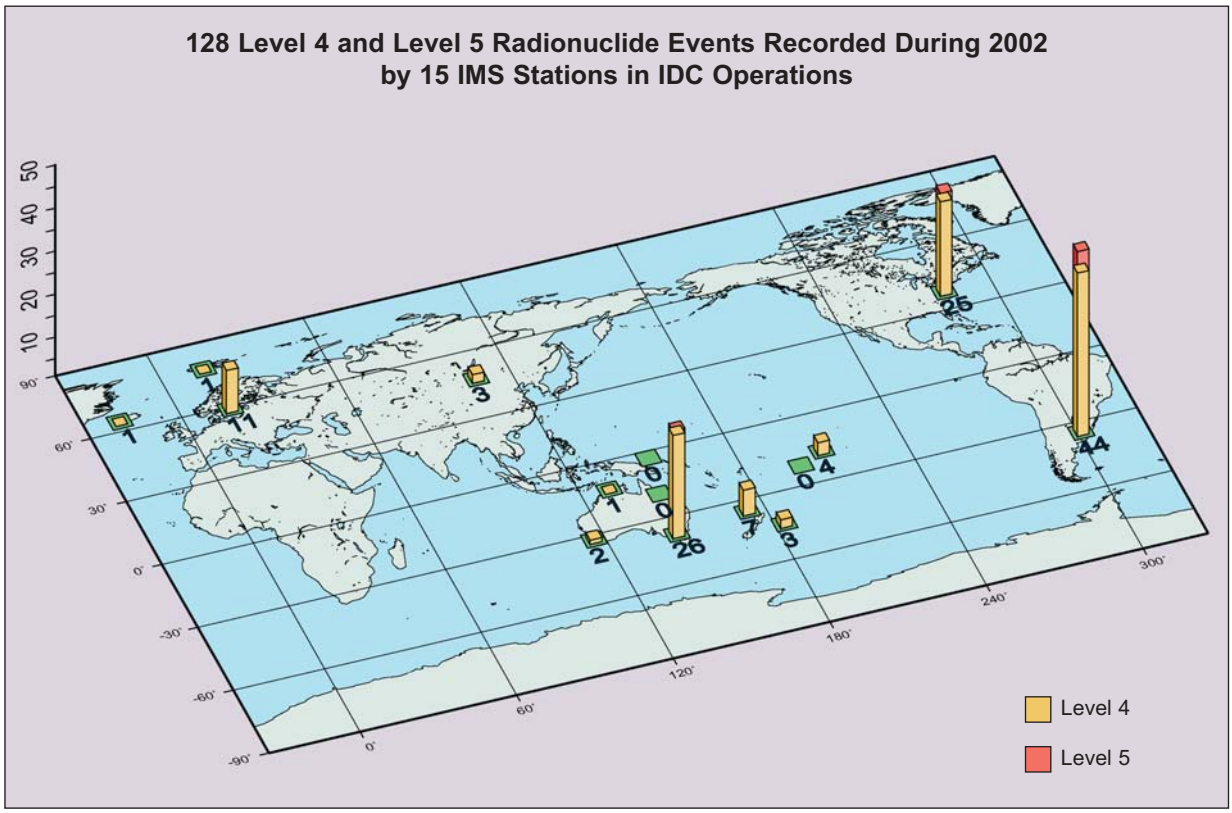
Testing and evaluation of radionuclide operational software and procedures continued with the addition of 6 new IMS radionuclide stations to IDC operations, bringing the total to 15 by the end of the year. These stations contributed approximately 3000 radionuclide spectra per month, including 450 sample spectra which were interactively reviewed. Anthropogenic radionuclides relevant to Treaty verification were detected in 228 of these spectra during the year, including iodine-131, caesium-137, technetium-99m, sodium-24, gold-198, cerium-141, cobalt-58, cobalt-60, iodine-133, iodine-124, antimony-122 and zinc-65. The numbers of spectra at the five categorization levels were: Level 1 (normal natural nuclides) – 3167 or 87.8% of the total; Level 2 (anomalous natural nuclides) – 209 or 5.8%; Level 3 (normal anthropogenic nuclides) – 103 or 2.9%; Level 4 (single anomalous anthropogenic nuclide) – 120 or 3.3%; and Level 5 (multiple anthropogenic nuclides) – 8 or 0.2%; the percentages at all levels are similar to those reported in 2001. The eight Level 5 spectra recorded during the year were due to six detections of iodine-131 in conjunction with technetium-99m (four cases), iodine-133 and zinc-65, as well as two detections of caesium-137 in conjunction with sodium-24 and cobalt-58. One of the iodine–technetium samples also contained iodine-124 and gold-198.



Maps showing oceanic wave paths (in red) from hydroacoustic station HA1 at Cape Leeuwin, Australia. Hydroacoustic energy signals are prevented from travelling to HA1 by islands and other land masses. (Green circles are seismic event locations.) The maps demonstrate recent improvements in hydroacoustic data processing at the IDC.

Data Fusion, Review and Services

At the end of the year, 58 secure signatory accounts (one for each requesting State Signatory) had been



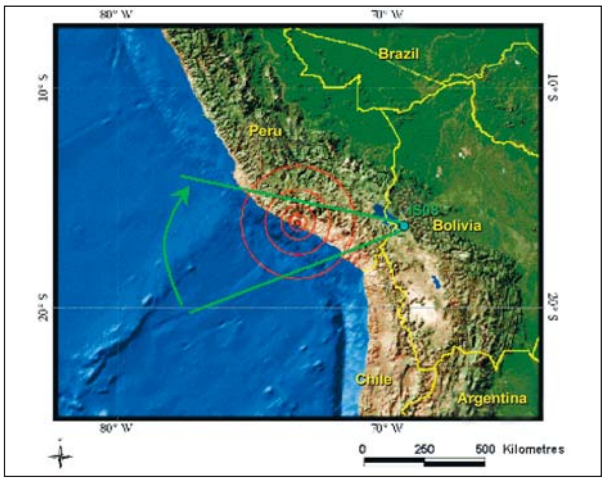
established, with a total of 424 users authorized to access IMS data and IDC products and receive technical support from the IDC. More than 600 requests from authorized users in States Signatories for technical information about the IDC, the Automatic Data Request Manager, access to data and products and data flow issues, as well as for the 'NDC in a box' software, were received and resolved. The software has been distributed to 51 States Signatories and gives NDCs the capability to analyse IMS data interactively. The IDC also assisted in the installation of this software, and the first remote installation from Vienna was made. PTS missions and outreach activities were supported by providing information about IDC products and services available to States Signatories. Work began on the redesign of IDC performance reports with a view to making them consistent with requirements of the draft IDC Operational Manual and using them as the basis for carrying out the IDC acceptance test.

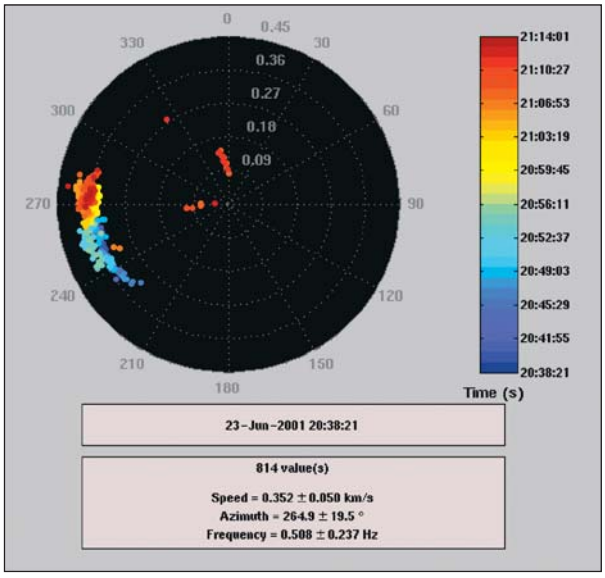
DEVELOPMENT

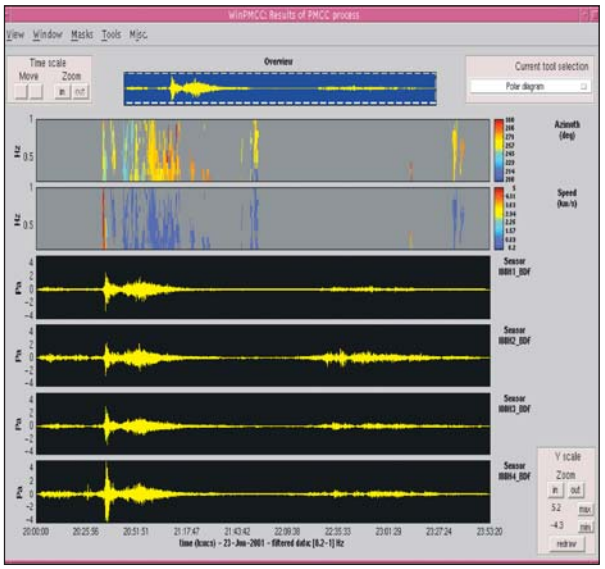
Waveform Development

Development work in the waveform area continued on the assessment of the methods used in the current applications software for all waveform technologies. In the seismic area, there was emphasis on the effectiveness of detection processes and the accuracy of initial and refined azimuth and slowness determinations. The station configuration tuning effort continued in order to configure the detection system for newly installed and upgraded seismic arrays as well as to enhance the configuration of existing arrays.

In the hydroacoustic and infrasound areas, several contracts were concluded to analyse the results of automatic processing, establish a reference event database and obtain support for enhancement of data processing. Prototype software for interactive processing of infrasonic signals developed by the French NDC was installed for testing.







The seismic calibration programme for improving the location of events based on the best available regional travel time information continued through five contracts already awarded to scientific organizations. These organizations provided information on well located calibration events and improvements in the regional travel time curves.

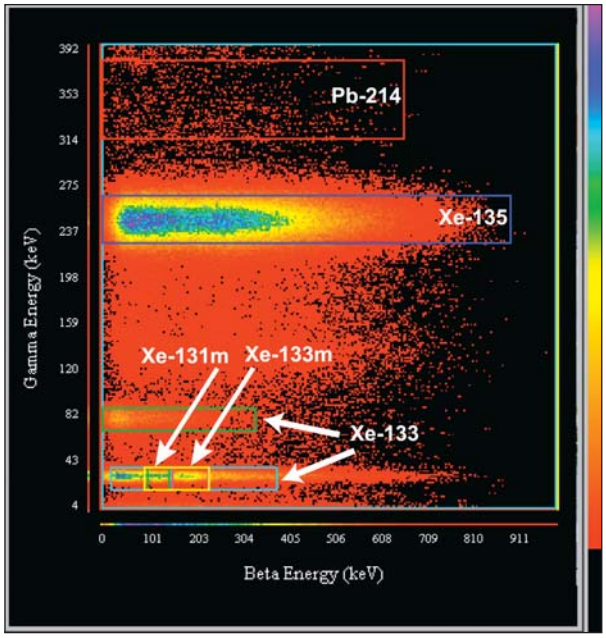
Radionuclide Development

Radionuclide development continued on issues pertaining to radionuclide detection and analysis and ATM. Work in the detection and analysis area focused on requirements for improved software for analysis of noble gas monitoring data; utilization of the previously developed Virtual Gamma Spectroscopy Laboratory simulation package to enhance identification of spectral peaks associated with natural radionuclides; and a review of the nuclear spectral lines library, including contributions of cosmic ray induced effects.

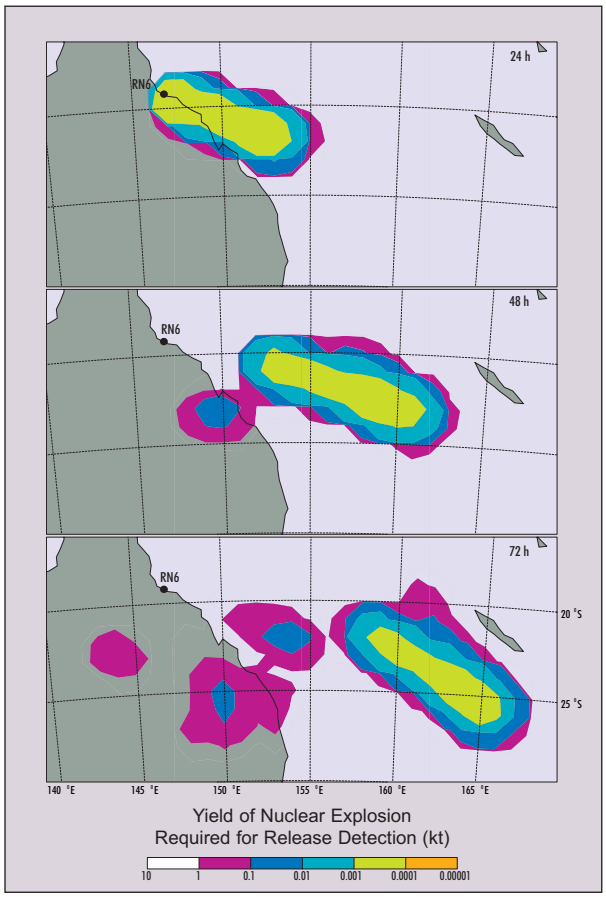
In the ATM area, development proceeded to the testing of new software for source area estimations using daily input data from well known meteorological centres to allow calculation of 'source–receptor sensitivity matrices' for operational stations and generation of detailed 'fields of regard' indicating possible source regions for detected radioactivity. Negotiation of a draft agreement began with the European Centre for Medium-Range Weather Forecasts for the necessary daily data feed. It is hoped that negotiations will be completed early in 2003 to enable the Policy Making Organs (PMOs) to examine the draft agreement.

In October 2002, the PTS and the WMO together hosted an international workshop – CTBTO–WMO: The Way Forward. Workshop discussions focused on how leading meteorological centres might provide independent modelling and analysis results in cases where a suspicious signature from a radionu-

Display of waveform data, as well as direction and speed of signals, recorded at infrasound station IS8 in La Paz, Bolivia, as generated by WinPMCC, a newly available software tool for interactive processing of infrasound data, which is being tested and evaluated at the IDC.



Simulation by the Virtual Gamma Spectroscopy Laboratory of a beta–gamma spectrum that contains all four Treaty-relevant xenon isotopes. The colour scale indicates the density of counts in the beta–gamma energy plane.



clide station had been detected. As a result, an international exercise involving regional WMO centres and the PTS will be held in early 2003 with the aim of testing facilities for the exchange and processing of data.

Software Integration

The framework for software development was elaborated and refined, considering all aspects of the software development and maintenance life cycle. A number of IDC standards were developed, including for documentation, programming and testing, as used in current software development projects. A commercial requirements engineering tool was installed and configured. This tool was used to store and manage software requirements for a number of projects. Configuration management procedures were further developed to support ongoing software maintenance.

Work proceeded on integration of the PKI with the applications software. This will allow full scale handling of authentication data. The applications software was modified to support domain name system (DNS) changes and the naming convention used at IMS waveform stations. An in-depth review was performed to document the status and dynamic interaction between applications software and the Oracle database. Software was developed to simplify and streamline the process of installing new auxiliary seismic stations on the test bed. Significant progress was also made in developing software to receive data in CD-1.1 format, and this software will be made available to States Signatories. Development of the waveform NDC in a box software (Geotool) and the transfer of historical GSETT-3 waveform data from the prototype IDC continued.

Differential fields of regard pertaining to an air sample collected at radionuclide station RN6 in Townsville, Australia, over a period of 24 h starting at noon on 15 December 2002. The analysis was done with the new atmospheric transport analysis system of the IDC, which employs source–receptor sensitivity matrices and a space–time resolution that has been improved by a factor of 50. The coloured areas indicate where a nuclear explosion of a certain yield, occurring in the 3 h time intervals starting one, two and three days before the end of sample collection, would be consistent with detection in that sample.

INFRASTRUCTURE

PTS Information Systems and Security Projects

The first version of the state of health monitoring system was installed, and the PTS Intranet was developed and launched. The first DOTS modules were developed and launched. Two Internet firewall penetration tests were performed, and discovered vulnerabilities were eliminated.

Computer Infrastructure

Significant effort was devoted to the administration, maintenance and operation of the computer infrastructure for the entire PTS, including the office automation network, document management tools, internal and external web sites, the network supporting the applications software and database management support. Other tasks included the design and development of the external database to allow timely access to mirrored copies of the operations and archive databases for authorized users in States Signatories (to become available early in 2003); the establishment of a development local area network on which the future IDC applications software is being developed; and the installation of a gigabit network infrastructure throughout the PTS, enabling all networking devices and computer systems to be attached to a high speed network, increasing throughput capacity and reducing the risk of failure. Continuous data processing capability was also enhanced through increases in data storage volume.

MAJOR PROGRAMME 3

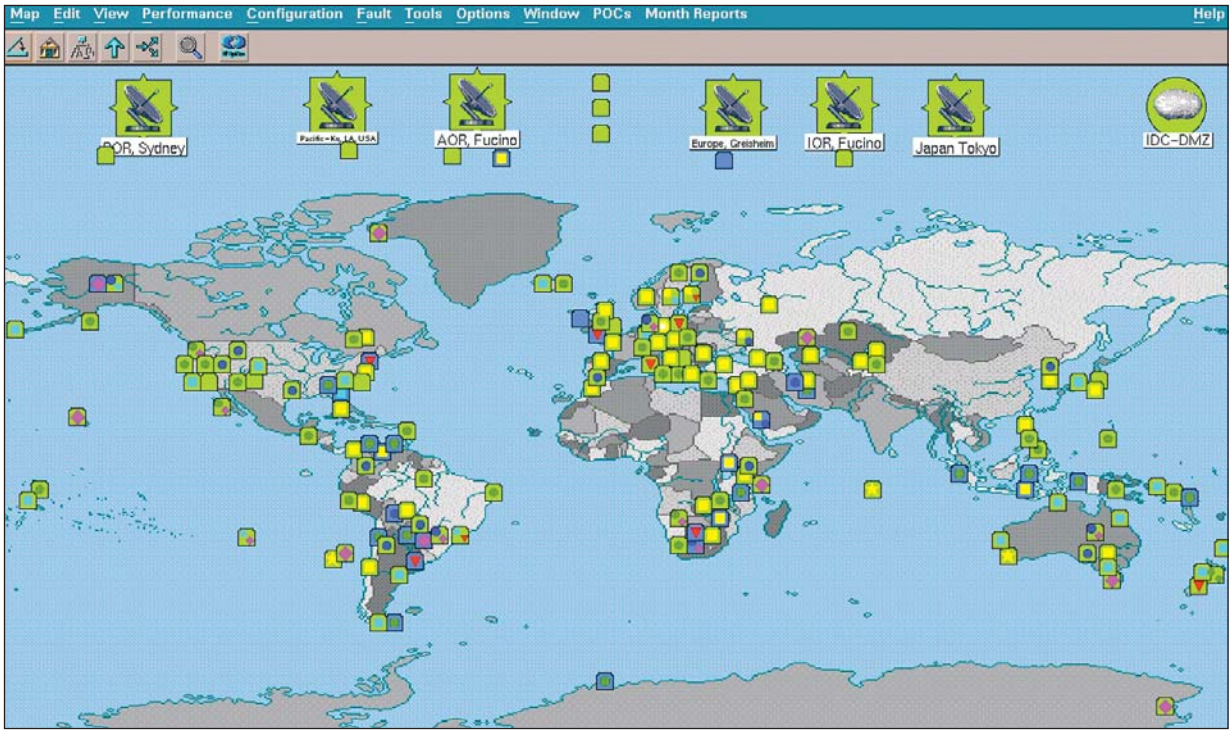
Communications

Major Programme 3:
Communications

Major Programme 3 has as its main components the transport of data from the IMS facilities, the distribution of IMS data and IDC products to States Signatories and the transport of the necessary ancillary data using the GCI.

GCI MANAGEMENT

As directed by the Commission, negotiations were continued with the GCI contractor, HOT Telecommunications Ltd, in order to find savings within the GCI contract to fund additional services and to support additional sites moved from the independent subnetwork topology to the basic topology at the request of the host States Signatories, as well as additional NDCs which requested to be connected to the GCI via very small aperture satellite terminal (VSAT). In addition, the PTS was requested to modify the GCI service level agreement to be more compatible with the IMS provisional O&M concept. The negotiations were successful, and the GCI contract can now support 250 VSAT sites, increased from 217 prior to the negotiations. It could also support an additional 100 sites utilizing the new virtual private network (VPN) topology, if the use of this technology is approved by the Commission as an option within the basic topology. Security has been enhanced for critical services such as email, DNS, telnet and file transfer protocol proxies.



Network management system for the GCI (screenshot).

NDC, Caracas, Venezuela.

AS50, Valguarnera, Sicily, Italy.

AS41, Jayapura, Irian Jaya, Indonesia.

AS11, Riachuelo, Brazil.

GCI TOPOLOGY

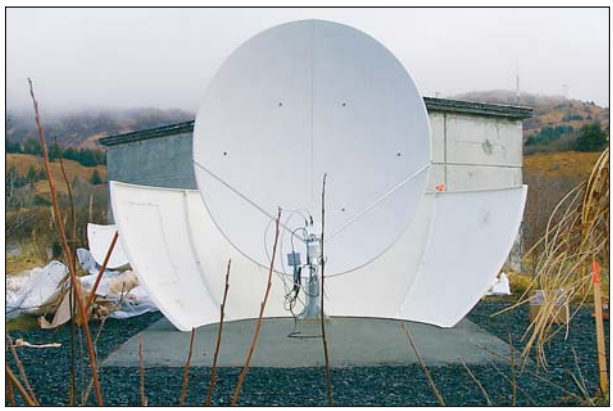
The secure VPN was installed and tested with connections at various sites. This topology may allow connection to difficult sites, or at sites where obtaining a licence to operate a VSAT is either not allowed or too expensive.

Progress continued to be made in the polar regions, where two stations were connected to the GCI through the use of shared resources with agencies of each of the countries concerned. The two polar region stations are now providing data, and three more will be connected in the first half of 2003.

Service providers of some of the GCI frame relay circuits were changed as a result of corporate restructuring in the telecommunications industry. The frame relay circuits to four VSAT hubs and to five NDCs were changed without incident. The ISDN back-up circuits to all of these points were also changed and tested. WorldCom, which filed for bankruptcy in 2002, has undertaken to continue to operate its network and to provide frame relay services for the GCI, but the PTS is exploring alternative solutions.

GCI IMPLEMENTATION

GCI coverage continued to expand. As of 31 December 2002, 181 GCI site surveys had been completed, and VSATs had been installed at 138 IMS, NDC and development sites. Also, 51 VSAT installations were completed in 2002, nearly meeting the planned number of 52 for the year. Difficulties in obtaining licences for VSATs continued to be an obstacle to installation of new sites, and the Commission appealed to States Signatories for their continued support. The PTS also conducted several missions to South American and



Installation of a VSAT antenna in a radome at auxiliary seismic station AS110, Kodiak Island, Alaska, USA, December 2002.

AS56, Tel-Alasfar, Jordan.

NDC/PS43, Belbashi, Turkey.

RN18, Punta Arenas, Chile.

AS105, Guam, Marianas Islands, USA.

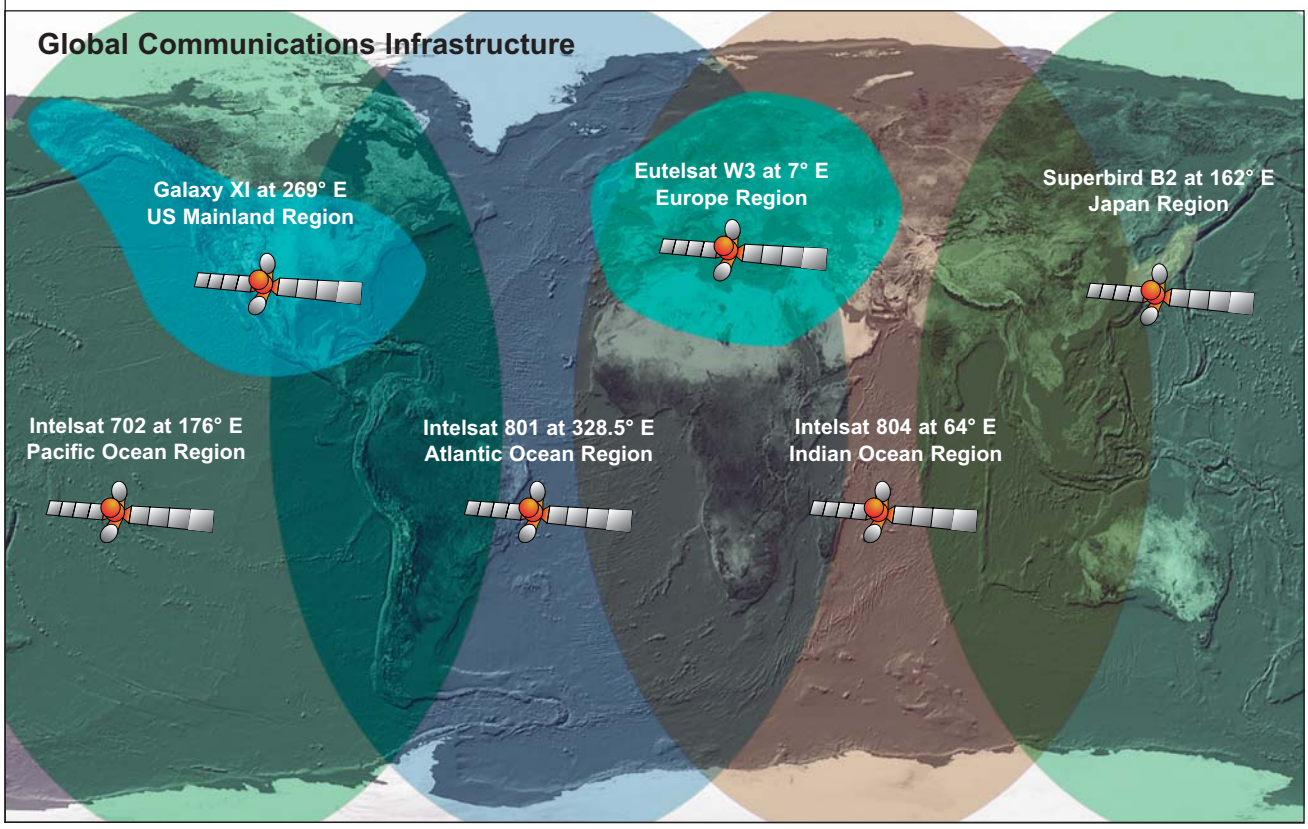
Asian countries to accelerate the licence process. Positive results were achieved with the addition of 22 VSAT licences obtained in nine countries.

Development work continued on the network management system (NMS), which provides availability and performance reports for all GCI connections. The GCI contractor began development of a more comprehensive problem tracking system, to be linked with the NMS and to provide systematic reporting of incidents and corrective actions taken. The new DNS and email services were implemented with the installation of servers at the IDC, as required, to enable the sending of email between the IDC, NDCs and stations.

Possibilities for sharing the GCI with third parties and forwarding primary data from the IDC to the NDCs of States Signatories were assessed by the PTS. The Commission subsequently adopted a set of rules for the provisional shared use of the GCI. These rules will be implemented in 2003.

INTERNET COMMUNICATION

The performance of the current Internet link (2 megabits per second) was consistent during 2002, with an average availability of 99.95%. During 2001, one major incident adversely affected the availability of the PTS



RL4/RN11, Rio de Janeiro, Brazil.

NDC, Daeion, Republic of Korea.

AS95, Afiamalu, Samoa.

AS78, Nana, Peru.

link to the Internet, causing a denial of service for about 10 hours. To prevent this from happening again, a second Internet link using a second service provider was established in 2002; this utilizes a new optical fibre connection to the Vienna International Centre (VIC) installed in 2001. The PTS now has two 2-megabit links, fully diverse and load sharing, to handle the normal Internet traffic and the new VPN traffic for the GCI.

WORKSHOP

A GCI–Evaluation Workshop was held from 21 to 24 October 2002 in Vienna for the purposes of training and technical discussion for GCI users. There were 70 participants from 20 States Signatories. The workshop focused on GCI operations, maintenance and functionality. Five recommendations were made concerning the establishment of single points of contact for the PTS and station operators; the enhancement of GCI security; the reporting of near real time status of the GCI, IMS and IDC to station operators and NDCs; and the advancement of simulation work. These recommendations will be considered by WGB in 2003. (See also “Workshops” in Major Programme 5.)

MAJOR PROGRAMME 4

On-Site Inspection

Major Programme 4:
On-Site Inspection

The primary objective of Major Programme 4 is to make the necessary preparations for the establishment of the OSI regime at entry into force of the Treaty. The major elements of OSI are inspectors, equipment and the OSI Operational Manual, together with supporting infrastructures.

The year 2002 saw a continuous build-up of these preparations. A large scale OSI field experiment was successfully conducted in Kazakhstan. Its results are expected to help to build up the regime in an efficient way. Useful contributions were also made by conducting OSI Workshop-8, Experimental Advanced Course 3 and the feasibility study of radioactive xenon measurement equipment.

DOCUMENTATION

Elaboration of Draft OSI Operational Manual

The elaboration of the draft OSI Operational Manual remained a priority task of the Commission. Based on the initial draft rolling text (IDRT) of the manual, the first reading up to Chapter 5 (Inspection Preparations) was completed and work commenced on Chapter 6 (Inspections for Underground Event Within the Territory of a State Party). States Signatories continued to explore possible ways for improving the manual drafting process. An emerging view is that to make the manual easy to use, it may be desirable to supplement it with a series of subordinate documents that contain the operational details, especially those of a technical and administrative nature.

The Commission continued to encourage States Signatories to contribute to the development of the manual and tasked the PTS to provide relevant input to the elaboration process by preparing material and, in particular, drafting missing elements of the draft manual of a clearly technical and administrative nature, taking into account results from workshops and experiments conducted by the PTS, upon request and for consideration by WGB. The PTS will continue to give priority support to the elaboration process.

Workshop

OSI Workshop-8 was held in Vienna from 24 to 28 June 2002, and concentrated on the manual elaboration, development of radioactive xenon and argon measurement systems and the results of the 2001 field experiment in Slovakia. Thirty-five experts from 17 States Signatories participated in the workshop.

The main outcomes reached at the workshop include specific suggestions on Chapters 3 and 4 of the manual, a proposal for WGB to consider functional requirements and technical specifications of the xenon and argon measurement systems, including the demonstration and testing of an available Ar-37 detection system, and the setting up of a special expert group under PTS supervision to work on a systematic utilization of the Seismic Aftershock Monitoring System (SAMS). The workshop also suggested that the PTS initiate development/selection and testing of software to support planning and implementation of OSI activities.

METHODOLOGY, INFRASTRUCTURE AND FIELD EXPERIMENTS

Following more than one year of intensive planning, and building on the lessons learned during the suc-

cessful field experiment in Slovakia in October 2001, the PTS conducted a large scale OSI field experiment in Kazakhstan in September–October 2002 (FE02). More than 25 surrogate inspectors, from 17 States Signatories and the PTS staff, spent three weeks in a remote part of Kazakhstan performing inspection activities, much as a real inspection team (IT) would following entry into force of the Treaty.

The experiment began with the simulation of an illicit underground nuclear explosion caused by detonating 12.5 tonnes of chemical explosives about 200 metres underground, utilizing an unused borehole at the former Soviet Union's nuclear test site near Semipalatinsk, Kazakhstan. In addition, to increase realism, several other kilogram sized chemical explosions were arranged to simulate the seismic aftershocks that would accompany an underground nuclear explosion. This scenario was not disclosed to the surrogate inspectors, so that they could more realistically perform some of the 'detective' functions required of a real IT.

The techniques employed by the surrogate inspectors over the 450 square kilometre inspection area included deployment of nearly a dozen portable seismometers, and the in-field collection and analysis of the data collected therefrom, to search for aftershocks; collection of soil and air samples in search of OSI-relevant radionuclides; and visual observation, including six hours of low altitude helicopter overflight, looking for anomalies or indications of recent human activity.

For the first time, these OSI techniques were performed and examined in an integrated fashion to ascertain the complementarity or synergy among them. In order to synthesize the data from these activities and to plan and control its in-field activities, the surrogate IT had to establish a base camp in a mining camp near the inspection area, and utilize and test communication equipment and procedures.

1

2

3

4

OSI field experiment in Kazakhstan:

1. Triggering event.
2. OSI equipment in transit.
3. Helicopter for overflight.
4. Aerial view of terrain.

5

6

7

8

FE02 also examined the interactions between an IT and a temporary Operations Support Centre (OSC) established in Vienna. These interactions included the activities to launch an OSI on the very short schedules required by the Treaty and by the rapid decay of some of the signatures that an IT would search for. Thus a small core element of the IT was brought to the OSC to do the pre-inspection planning for when the team would arrive in the field. As part of this process, commercial high resolution satellite imagery was obtained and combined with the extremely sparse map information available for the region to make a multi-source map for the inspectors. More than 2 tonnes of equipment was shipped from Vienna to the point of entry in Almaty, Kazakhstan.

As a part of the preparation for FE02 an initial health and safety (HS) concept was developed. This concept, inter alia, requires that future inspectors receive adequate HS training during an OSI and that they meet appropriate fitness standards. Other elements of the HS programme that were exercised during FE02 included performing radionuclide surveys as part of inspection activities and monitoring participants' exposure to radiation while working in the former nuclear test site (none of the participants was exposed to a radiation level higher than the average background).

Because the objectives of FE02 were to contribute to the elaboration process of the draft OSI Operational Manual as well as to PTS practices and procedures related to OSI activities, six evaluators observed every aspect of FE02, recording several hundred lessons and recommendations. These will be considered by the PTS and the PMOs, as appropriate, for possible implementation. The lessons may help guide the scope of OSI equipment characteristics and employment, and the development of inspector training programmes, as well as future OSI field experiments and simulations.

OSI field experiment in Kazakhstan (cont.):

5. Taking an environmental soil sample.
6. Collecting soil gas samples.
7. Monitoring for radioactive contamination.
8. Operations centre at the base camp.

TRAINING AND OPERATIONS

The main goal of OSI training activities continued to be the development of a programme of training and exercises for future inspectors and inspection assistants.

The PTS finalized its proposal for a Long Range Plan (LRP) for the training and exercise programme (TEP) to be used after the entry into force of the Treaty. The PTS proposal includes the required qualifications of the trainee inspectors, the necessary training courses and exercises and their curricula, the training cycle, identifying possible trainers, an implementation plan and costs. The LRP was presented to WGB in 2002, and its objectives and structure for a training cycle were generally accepted. The PTS will continue to develop training concepts and tools based on this draft LRP with a view to preparing, for consideration by the PMOs, possible final curricula for all the courses to be used in the training cycle for inspectors and inspection assistants after entry into force.

Third OSI Experimental Advanced Course, Vienna, November 2002.

As an established element of the LRP, the sixth OSI Introductory Course took place in Vienna from 6 to 10 May 2002 with 39 participants, consisting of experts in OSI technologies and representatives of National Authorities, from 32 States Signatories. The main topics covered were the phenomenology of nuclear explosions and the OSI process, including key elements such as managed access. By the end of 2002, 215 trainees had participated in introductory courses contributing to the build-up of the OSI regime and to an increase in the cadre of potential candidates for advanced training activities, field experiments and OSI equipment testing.

The third OSI Experimental Advanced Course (EAC3) for the leadership of the IT was conducted in Vienna from 18 to 25 November 2002. Twelve experts from 12 States Signatories participated in the course, which was a short version of the planned full scale course. The aim, as defined in the LRP, was to test the concept and develop a curriculum of the relevant Advanced Course with the specific requirements for OSI leadership. The participants discussed and commented on the experimental curriculum presented to them. As a result of practical experience gained through the course, it was concluded that the curriculum of the full scale course should combine training in team building and negotiation skills with scenario based simulations and case studies based on various OSI situations. The full scale course is also expected to include a review of relevant parts of the OSI Operational Manual and field exercises.

EQUIPMENT

A list of equipment for use during OSIs must be considered and approved at the initial session of the Conference of the States Parties. The current status of the Commission's work on a list of equipment for various categories and approval of the initial specifications thereof is summarized in Table 3. The Commission's mandate also requires it to acquire or otherwise make provisions for the availability of relevant inspection equipment, including communication equipment, and conduct technical tests of such equipment as necessary. The types of equipment currently in the custody of the PTS are also indicated in the table. In 2002, the Commission approved a revision to the specifications for video cameras. However, although efforts continued, no substantial equipment categories additional to those presented in the 2001 Annual Report – especially of specialized OSI equipment – were obtained or added to the PTS custody/inventory in 2002, nor were offers or pledges for these items received from States Signatories.

The PTS therefore continued to devote significant effort to further refining the requirements for and methods of obtaining equipment with unique technical

Table 3. Current Status of List of OSI Equipment and Technical Specifications Approved by the Commission for Testing and Training Purposes

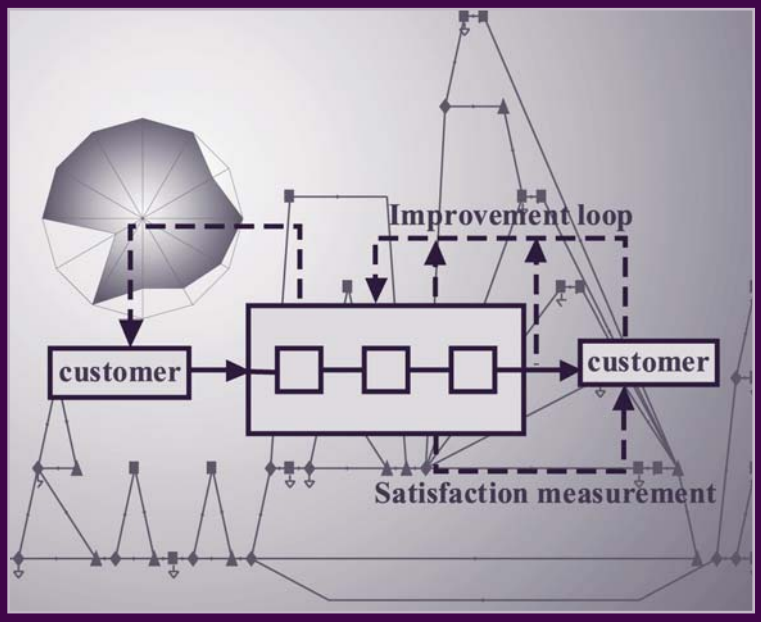
Activities and Techniques Specified in Part II of the Protocol to the Treaty	Equipment Approved (or to be Further Considered) by the Commission	Equipment Obtained by the PTS[a]	
		In PTS custody	In State Signatory custody
Position finding (para. 69(a))			
• From the air	Analogue altimeter	✓	
• At the surface	Satellite based positioning system	✓	
	Handheld range finding equipment	✓	
	Pocket transit compass	✓	
	Analogue altimeter	✓	
Visual observation (para. 69(b))	Field glasses/binoculars	✓	
	Binocular microscope	✓	
	Magnifying glass	✓	
Video and still photography (para. 69(b))	Handheld 35 mm camera	✓	
	Handheld instant camera	✓	
	Media for camera	✓	
	Processor for photographic film	✓	
	Handheld video camera (analogue)	✓[b]	
	Video cassette recorder	✓	
Multispectral imaging (including infrared measurements) (para. 69(b))	Not yet approved		
Measurement of levels of radioactivity – gamma radiation monitoring and energy resolution analysis (from the air and at or under the surface) (para. 69(c))	Handheld search and limited gamma identification tools	✓	
	Vehicle-portable search and limited gamma identification tool		
Current list of radionuclides of OSI interest: ^{37}Ar, ^{95}Zr, ^{95}Nb, ^{99}Mo, ^{103}Ru, ^{115m}Cd, ^{131}I, ^{132}I, ^{132}Te, ^{131m}Xe, ^{133m}Xe, ^{133g}Xe, ^{135}Xe, ^{140}Ba, ^{140}La, ^{141}Ce, ^{144}Ce, ^{144}Pr, ^{147}Nd, ^{99}Tc, ^{106}Rh	High resolution gamma spectrometer tool for field and laboratory use – 'blinded' or measurement restricted		
	Equipment for xenon sampling, separation and measurement		
	Argon-37 equipment for sampling, separation and measurement – not yet considered		
	Aerial gamma spectroscopy equipment		
Environmental sampling and analysis of solids, liquids and gases (para. 69(d))	To be elaborated		
Passive seismological monitoring for aftershocks (para. 69(e))	Passive seismic equipment	✓	
Resonance seismometry and active seismic surveys (para. 69(f))	Resonance seismometry equipment – not yet approved		
	Active seismometry equipment – not yet approved		
Magnetic and gravitational field mapping, ground penetrating radar, electrical conductivity measurements at the surface and from the air (para. 69(g))	Magnetic field mapping equipment Gravitational field mapping equipment Ground penetrating radar Electrical conductivity measurement equipment		
Drilling (para. 69(h))	Not yet considered		
Communication equipment (para. 62)	Not yet considered		

[a] Equipment 'obtained by the PTS' is categorized in accordance with paragraphs 39 and 40 of Part II of the Protocol and is obtained by the PTS through special procurement procedures in accordance with the decision of the Commission at its Eighth Session (CTBT/PC-8/1/Annex II).
[b] This item indicates progress made since the 2001 Annual Report.

specifications. For xenon sampling, separation and measurement equipment, a comprehensive feasibility study commissioned and undertaken by an independent contractor was completed. As a result, enhanced progress can be expected towards achieving the Commission's technical objectives for this technique following acceptance of the refined functional and operational requirements. In collaboration with the Istituto Nazionale di Geofisica e Vulcanologia, Italy, the PTS also finalized preparation of the initial phase of the equipment demonstration programme, to be conducted in 2003 for some approved geophysical techniques, in which State Signatory nominated experts will participate. Further significant progress was also achieved in improving the functional capabilities of hardware and software for passive seismological monitoring for aftershocks, based on the recommendations and suggestions of State Signatory experts who participated in the related activities. This effort is expected to be continued with field testing of the equipment. A prototype relational database was developed by the PTS to assist in monitoring the status of all equipment items: this has the capability to generate required reports for operational purposes. The prototype is currently being refined and upgraded.

Handheld search and limited gamma identification tool.

Portable processor for photographic colour film.



MAJOR PROGRAMME 5

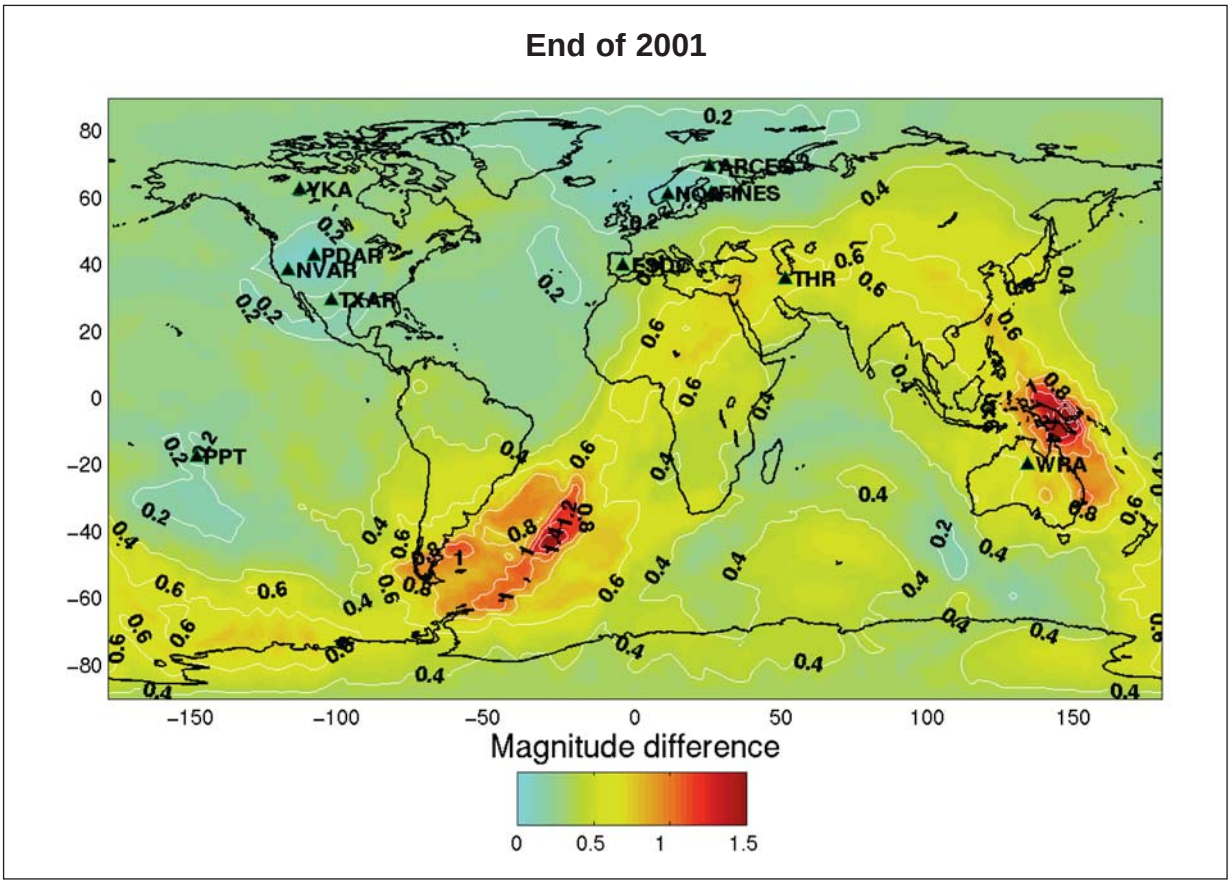
Evaluation

Major Programme 5:
Evaluation

Further progress was made in developing and implementing within the PTS an evaluation framework and quality assurance (QA) elements for the verification regime. The PTS continued to conduct its work on these two basic components in a balanced manner. New approaches were undertaken, especially through the development and consolidation of conceptual and technical synergies between evaluation and QA elements. Specific capabilities were further developed for contributing to an overall evaluation of the verification system and for focusing on issues related to key segments and components of this system as it develops.

Figure 1. *Estimated automatic detection capability of certified IMS primary seismic stations at the end of 2001 (below) and 2002 (opposite) relative to that of the 49 currently known stations of the primary seismic network under ideal conditions (full station availability and low background noise).*

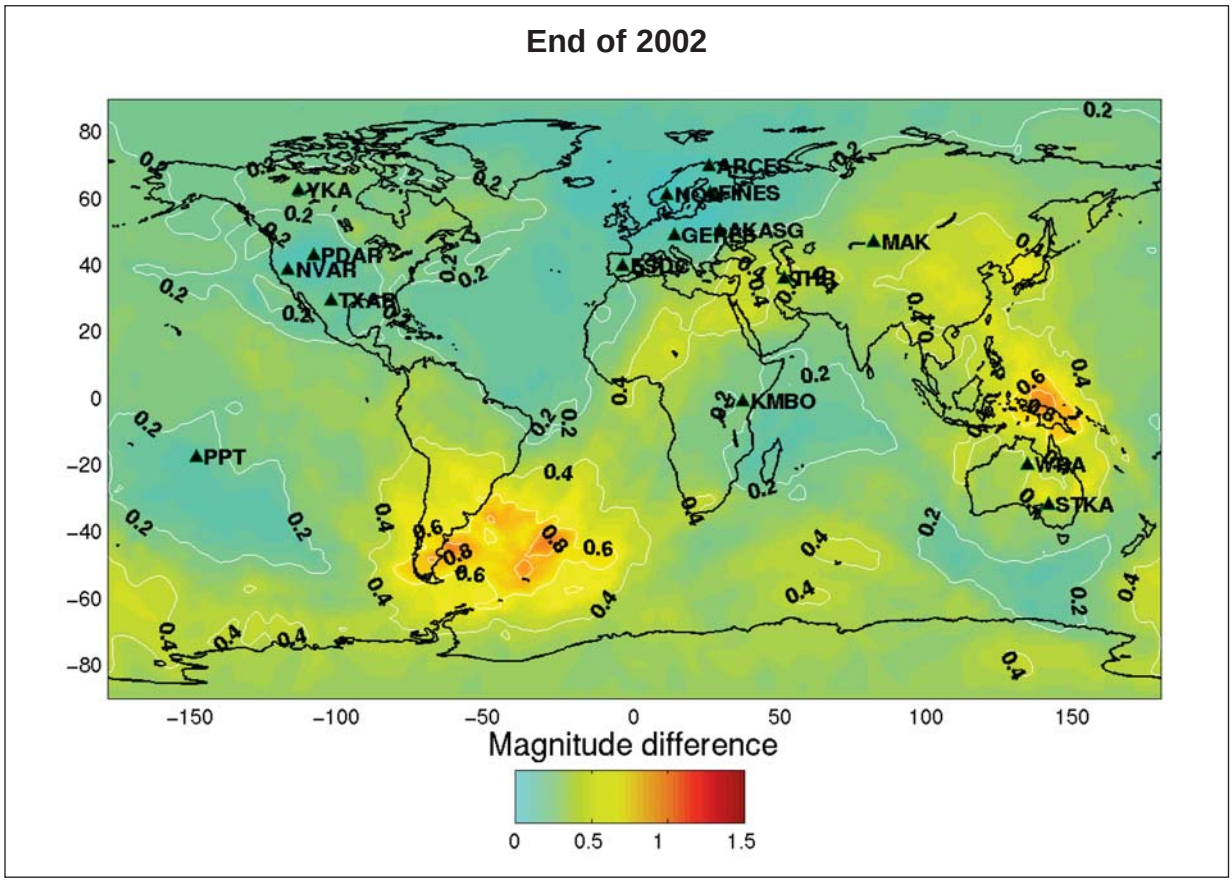
Relative detection capability is shown as a difference in body wave magnitudes. An event is considered detected when its signal exceeds the noise level by a factor of 3 at three or more stations. Areas with large magnitude differences (dark red) in the map for the end of 2002, with 16 certified stations, show a marked decrease in size relative to the end of 2001, when there were 11 certified stations. Since only primary seismic data were considered in this evaluation, fusion with inputs from other IMS technologies would improve the overall picture even further.



EVALUATION

Further work was conducted to develop and promote evaluation tools and metrics for verification activities conducted by the PTS. Activities on the waveform technologies tools focused on the routine usage of the threshold monitoring software (Tmtool), which is intended for interactive assessment of the performance of the IMS seismic network under various circumstances, such as the detection capability at a given time of the certified stations of the primary seismic network relative to that of the planned final network. Comparing the performance at the end of 2002 and at the end of 2001 (Figure 1), Tmtool shows a marked improvement in the detection capability of the primary seismic network. Feedback obtained on the functional capabilities of Tmtool led to a definition of possible additional features. Their implementation is expected to be completed by the third quarter of 2003. In the seismic field also, assessment of the usefulness of the Bulcmp software, a tool for bulletin comparison, began. The goal is to be able to benchmark IDC seismic products against those of other institutions.

On radionuclide technology, development of the Aatami software advanced significantly. Aatami is designed especially for the verification regime needs: it is capable of specific and complex operations which cannot be performed in a comprehensive and synchronized way by any other software currently available. Aatami was also developed with a special concern to ensure full coverage of software documentation, resulting in transparency and user friendliness. In 2002, the software was routinely used in the process of certifying IMS radionuclide stations. Also, 2002 marked the start of an assessment phase, known as beta testing, with interested NDCs. The aim of this assessment phase is to test Aatami's multidimensional qualities and capabilities.



QUALITY ASSURANCE

Consistent with priorities and guidance from WGB, particular emphasis was put on QA in the context of provisional O&M issues. QA and technical evaluation support was provided to the provisional O&M coordination group; for example, in the development of the terms of reference for a contract aiming at developing and documenting the O&M procedures for IMS stations used by the various stakeholders, in order to ensure that they are aligned and work efficiently. With regard to the draft IMS Operational Manuals, inputs were given on the revised structure.

Support was also provided for the certification process of IMS stations by investigating the use of a browsable CD-ROM containing all electronically available documentation for a station and providing capabilities for searching by means of keywords and/or an automatically generated index. This new procedure was tested for some IMS stations that were due for certification. This method will be further assessed in 2003.

SYNERGY OF QA AND EVALUATION

Interaction between QA and evaluation, as two complementary means, enhances the capacity to achieve the best possible verification capabilities in terms of efficiency and value for money.

An ad hoc expert group was convened to evaluate hydroacoustic data processing tools used at the PTS. Supported by the PTS, the expert group is reviewing the operational tools available and the application of underlying physical principles (including modelling), as well as envisaged improvements, and will provide advice to the PTS. The group met in June and October 2002. Owing to budgetary reasons the last meeting to finalize the report was postponed.

Evaluation support was provided for the OSI field experiment in Kazakhstan. In this respect, the following points were considered. First, attention was paid to PTS know-how in organizing the exercise and gathering observations that would be used later as lessons in the drafting of the OSI Operational Manual. Then, a number of key elements for an inspection were addressed: the manual, the IT composition and the training of inspectors. Special attention was paid to competencies of the team leadership, including technical knowledge, diplomatic and legal skills and the ability to run operations. Consideration was also given to exploring means for more process integration in order to improve the capability of an IT to fulfil its obligations within the tight time constraints imposed by the Treaty and by the phenomenology of a triggering event.

WORKSHOPS

Forty-nine participants from 18 countries, together with staff from the PTS, took part in the 2002 evaluation workshop, which focused on PTS and NDC interaction for the evaluation of the verification system. The workshop was held in Oslo, Norway, from 6 to 10 May 2002. The opportunity to share experiences between the PTS and NDCs of widely different sizes and levels of development benefited all participants. The workshop's conclusions were examined by WGB, leading to a recommendation on database access which was adopted by the Commission. The proceedings of this workshop are available both in hard copy and on CD-ROM.

In line with WGB's request for the PTS to organize, through joint effort, workshops with more streamlined and integrated agendas, the evaluation workshop on QA issues and the GCI workshop, which were envisaged separately for the end of 2002, were combined. The joint workshop, which took place from 21 to 24 October 2002 in Vienna, focused on technical discussions between the PTS and managers or operators of IMS stations and NDCs. A number of recommendations were formulated for consideration by WGB. (See also "Workshop" in Major Programme 3.)

MAJOR PROGRAMME 6

Policy Making Organs

Major Programme 6:
Policy Making Organs

The Commission held three sessions in 2002. It was chaired for the first six months by HE Ambassador Abdul Bin Rimdap, Permanent Representative of Nigeria, and for the second half of the year by HE Ambassador Liviu Aurelian Bota, Permanent Representative of Romania.

The Commission's subsidiary bodies, Working Group A (WGA), Working Group B (WGB) and the Advisory Group, each met three times in 2002. WGA, chaired by HE Ambassador Tibor Tóth (Hungary), made recommendations, subsequently adopted by the Commission, on administrative and budgetary matters, including human resources issues. WGB, chaired by Mr Ola Dahlman (Sweden), continued its consideration of verification related issues over three sessions each of three weeks' duration. The first week of each session was devoted to discussions on the draft OSI Operational Manual. The recommendations of WGB, subsequently adopted by the Commission, addressed, inter alia, the content of the 2002 and 2003 verification work programmes. WGB also reviewed the report of the evaluation by external experts of the implementation of the IMS Major Programme and agreed to a similar evaluation of the OSI Major Programme, to take place in 2003. The Advisory Group, chaired by Mr André Gué (France), considered and provided advice on financial, budgetary and administrative issues.

For 2003, the Commission decided on a reduction in the number of its sessions and those of its subsidiary bodies to two each.

MAJOR PROGRAMME 7

Administration, Coordination and Support

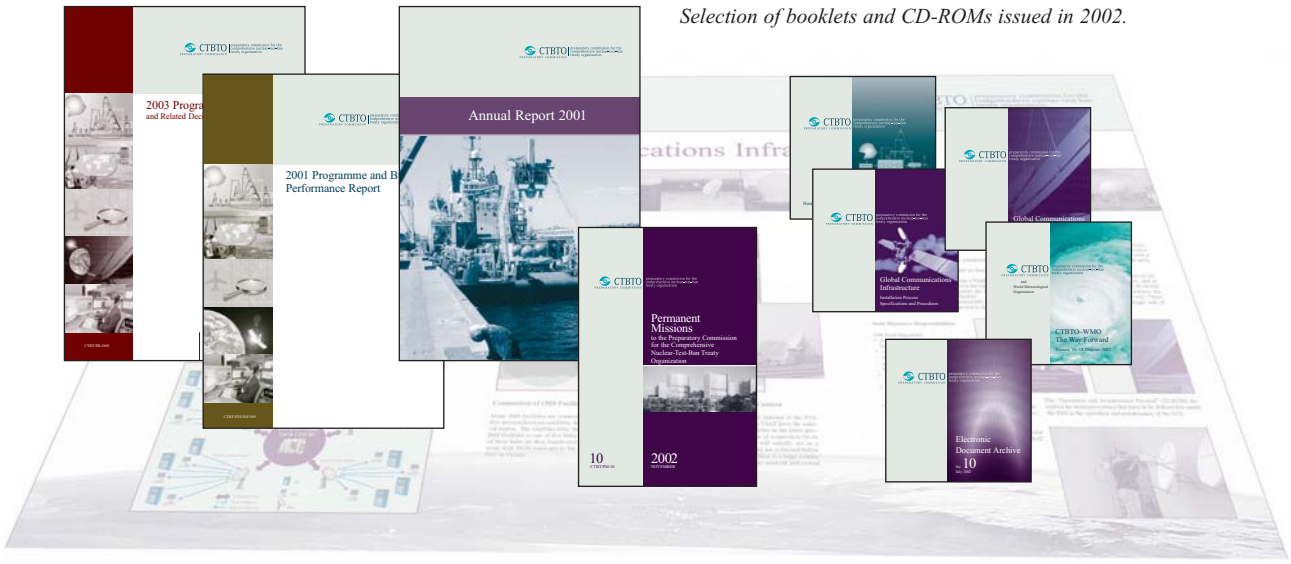
Major Programme 7:
Administration, Coordination and Support

CONFERENCE SERVICES

The PTS provided substantive support to the Chairpersons of the Commission, Working Groups A and B and the Advisory Group in the preparation and conduct of their meetings, including the drafting of the report of each session. The PTS also supported training courses and workshops in Vienna, and consultations by States Signatories on matters relating to Article XIV of the Treaty. During 2002, a total of 920 official documents (including 572 meeting related documents) were prepared and distributed to States Signatories, as compared with 864 in 2001. The total number of original pages prepared for printing and distribution increased from 11 194 in 2001 to 17 661 in 2002.

All official documents of the Commission were processed and archived on the automated Document Management System (DMS). In 2002, the capabilities of the system were extended to allow States Signatories to retrieve documents through a secure web site, the Experts Communication System, in the official languages of the Commission. The DMS was accepted within the PTS as an organization-wide standard. It was presented to the Inter-Agency Meeting on Language Arrangements, Documentation and Publications, held in Vienna in July under the chairmanship of the United Nations Under-Secretary-General for General Assembly Affairs and Conference Services, Mr Jian Chen. Considerable interest was expressed by participants in view of the benefits to international organizations of such systems.

In addition to the 2001 Annual Report, documents relating to the Programme and Budget and reports of international meetings, the PTS issued supporting materials for various workshops, including the programme and CD-ROM for the workshop on CTBTO–WMO cooperation (see "Radionuclide Development" in Major Programme 2) and a brochure and CD-



Selection of booklets and CD-ROMs issued in 2002.

ROMs for the GCI–Evaluation Workshop (see "Workshop" in Major Programme 3). The updated Electronic Document Archive CD-ROM containing reports of the Commission in 2002, as well as background information on the work of the Commission, was distributed to the States Signatories.

Following the decision taken by the Commission at its Seventeenth Session, the PTS promulgated in an Administrative Directive a set of rules and procedures for the preparation, review and issue of Technical Papers written by staff members. Work commenced on consolidating the PTS policy and procedures on the handling of sensitive information. Also, the Secretary of WGB was appointed as a point of contact between the PTS and the PMOs on matters related to security and information.

The PTS assisted States Signatories in accrediting their Permanent Representatives to the Commission. In 2002, 23 new Permanent Representatives were accredited, bringing the total number of accreditations to 100 as compared with 95 at the end of 2001.

FINANCIAL SERVICES

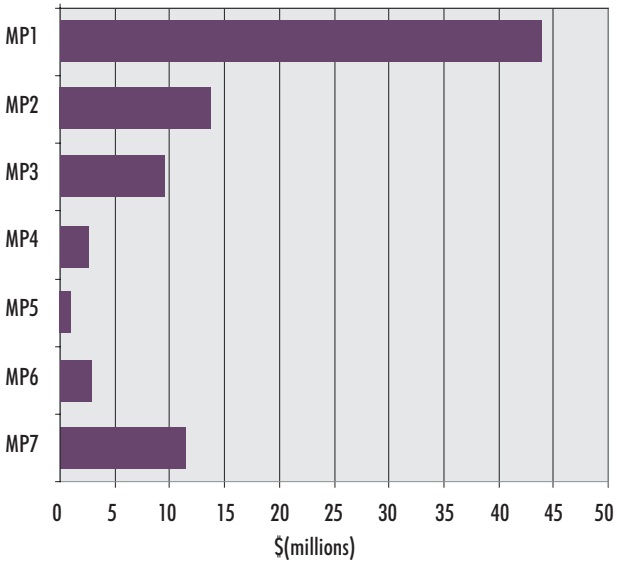
The budget for 2002, at an exchange rate of 1 US dollar to 1.13 euros, amounted to US$85 091 100, which represented 1.1% real growth over 2001. Of the total budget, 83% was allocated to verification related activities, including an allocation of $34 495 000 to the Capital Investment Fund (CIF), established for the build-up of the IMS network. A breakdown of the 2002 Programme and Budget by Major Programme is shown in Table 4.

By 31 December 2002, 65 States Signatories had made full payments and 17 had made partial payments of assessed contributions for 2002, amounting to 88.73% of the total 2002 assessed contributions.

The expenditures for the Programme and Budget in 2002 amounted to US$71.7 million, of which $24.7 million was from the CIF. For the General Fund, the unused budget authority amounted to $3.6 million, or 7% of the total amount approved for the year. For the CIF, approximately 69% of the allotment was executed by the end of 2002. More detailed information on budget implementation can be found in the *2002 Programme and Budget Performance Report.*

Table 4. 2002 Programme and Budget by Major Programme

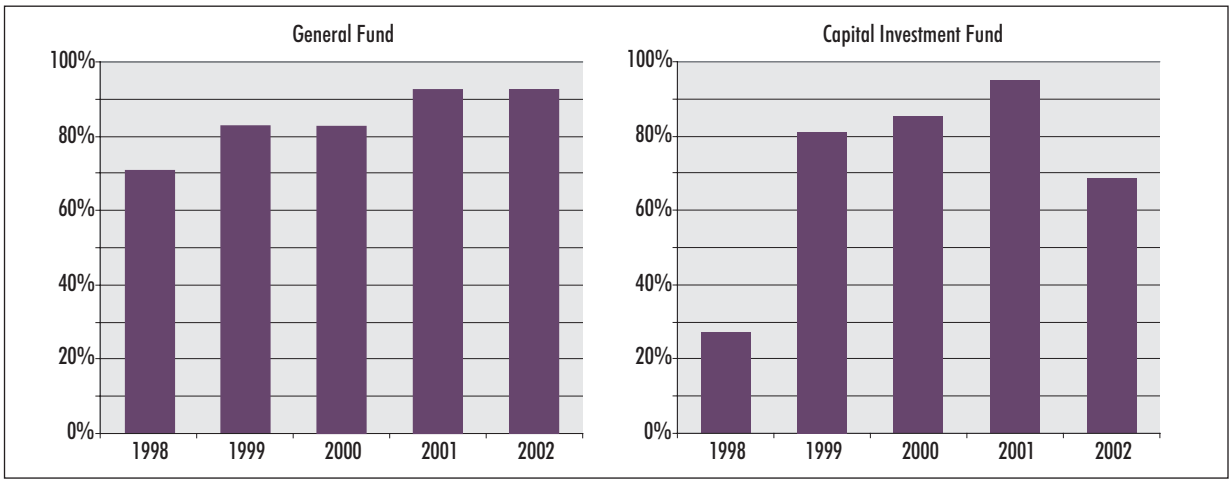
Major Programme	$(millions)
MP1: International Monitoring System	44.0
MP2: International Data Centre	13.7
MP3: Communications	9.6
MP4: On-Site Inspection	2.6
MP5: Evaluation	1.0
MP6: Policy Making Organs	2.8
MP7: Administration, Coordination and Support	11.4
Total	**85.1**



PROCUREMENT

The PTS processed more than 270 procurements in 2002. Under the contract for the GCI, payments amounting to $8.4 million were made.

The procurement management software purchased in December 2001 entered into active use in July 2002; submission of procurement requisitions using the software began in December 2002. Optimum use of the system should facilitate procurement management by avoiding redundant input of procurement data and allowing information on each procurement action to be automatically disseminated to the users.



Spending rates for the General Fund and Capital Investment Fund, 1998–2002.

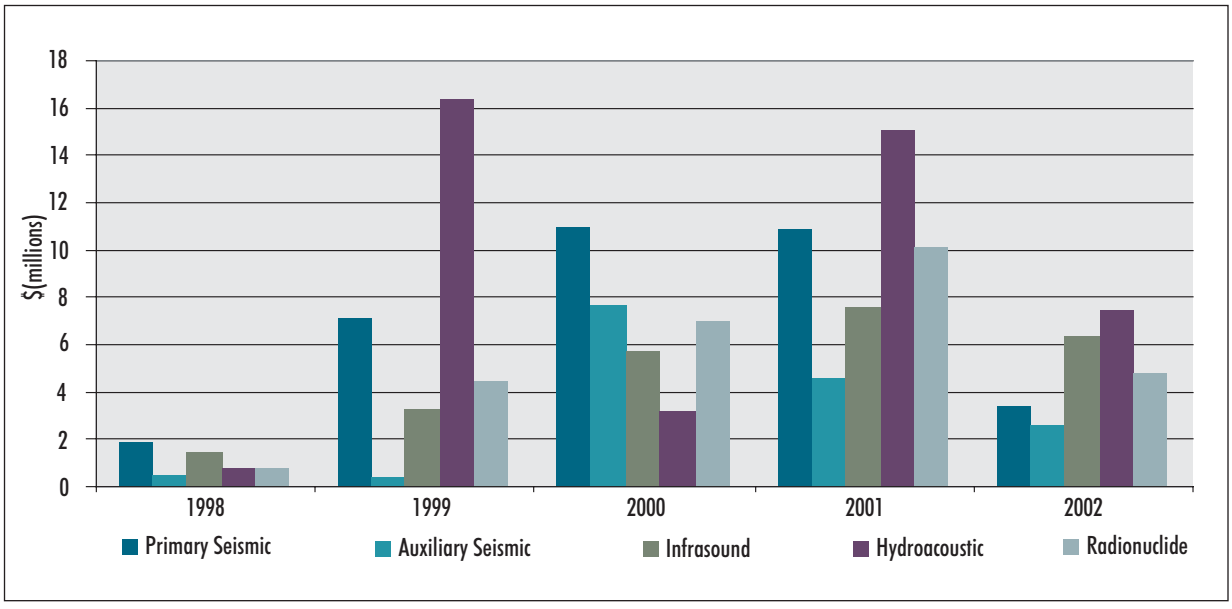
The PTS finalized the model contract on testing and evaluation and post-certification activities for IMS stations. Contracts for 18 IMS stations based on the model contract were concluded in 2002.

Financial Rule 11.5.06, Exceptions to Competitive Procedures, stipulates that the Commission should be informed about all contracts over $150 000 which were awarded after one of the exceptions listed in the aforementioned Rule had been invoked. In 2002, 24 contracts falling into this category were concluded, with a total value of approximately $9.8 million.

PERSONNEL

The PTS secured the human resources for its operations by recruiting and maintaining highly competent and motivated 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 and to the importance of recruiting staff on as wide a geographical basis as possible.

As of 31 December 2002, the PTS had 266 staff members from 69 countries, as compared with 268 staff



Expenditure by IMS technology, 1998–2002.

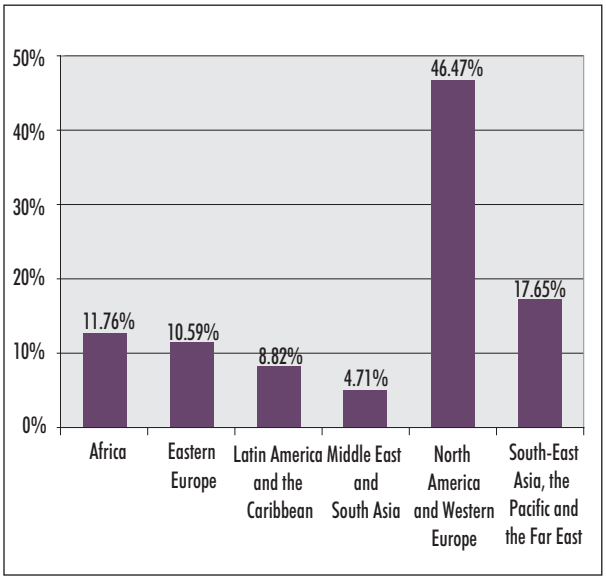


Figure 2. *Staff members in the Professional category by geographical region (as set out in Annex 1 to the Treaty).*

members at the end of 2001. A total of 3230 working months were recorded during 2002, as compared with 3071 during 2001. Figure 2 provides information on the distribution of staff members in the Professional category by geographical region. Table 5 provides a breakdown of regular staff members by field of work.

The PTS continued its efforts to increase the representation of women in the Professional category, which stood at 27.06% at the end of 2002, as compared with 27.38% at the end of 2001. Compared with 2001, the number of women staff members at the P4 and P5 levels increased by 16.6% and 12.5%, respectively, while at the P3 and P2 levels there were decreases of 5.5% and 7.1%, respectively. The recruitment efforts continued against the background of low numbers of female applicants for the majority of vacancies for scientific and information technology related posts.

In 2002, the PTS appointed 26 regular staff members. In addition, the PTS processed contracts for 71 consultants, 58 contracts for short term staff, 36 contracts for short term staff assigned to meetings, and contracts for 1 junior professional officer, 2 interns and 5 linguists.

The PTS organized various training courses in computer and information technology, office and project management, staff development, cross-cultural communication and management. Accordingly, during the year, 113 staff members participated in internal and external training.

In the staff administration field, the framework provided by the Staff Regulations and Rules was refined by further developing and improving administrative practices. The new investment scheme for the Provi-

Table 5. Regular Staff Members by Field of Work

Field of Work	Professional	General Service	Total
Evaluation Section	4	1	5
International Monitoring System Division	35	15	50
International Data Centre Division	76	26	102
On-Site Inspection Division	11	6	17
Total, verification related	***126 (74.12%)***	***48 (50%)***	***174 (65.41%)***
Office of the Executive Secretary	3	3	6
Internal Audit	2	1	3
Division of Administration	24	36	60
Legal and External Relations Division	15	8	23
Total, non-verification-related	***44 (25.88%)***	***48 (50%)***	***92 (34.59%)***
Total	**170 (100%)**	**96 (100%)**	**266 (100%)**

dent Fund of the Commission, which was introduced in cooperation with BNP Paribas/Parvest in 2001, was fully implemented in 2002.

Pursuant to a report issued by an external consultancy firm on its personnel and management practices, the PTS devoted considerable effort to addressing the issues raised in the report. Discussions involved managerial and other staff from the administration as well as from the verification Divisions. One of the significant issues addressed during the year was the revision of the provisions concerning working hours and time recording. The PTS began a review of recruitment procedures, career development and the system governing performance appraisals and rewards in order to adjust existing procedures and practices with a view to increasing transparency and efficiency. The PTS also addressed the issue of its 'non-career' policy, in particular the seven year limitation of service.

GENERAL SERVICES

The PTS continued to be involved in the preparations for the VIC asbestos removal project, with the health and safety of the persons in the VIC as the foremost consideration.

To further enhance the security of persons on duty travel, the PTS concluded a comprehensive contract for emergency medical assistance and medical evacuation.

EXTERNAL RELATIONS

The PTS continued to focus its efforts on enhancing understanding of the Treaty, promoting its entry into force and universality, and encouraging wider participation in the work of the Commission. Particular emphasis was also given to developing relations with relevant international organizations.

Signatures and Ratifications

During 2002, one State (Botswana) signed and eight States (Botswana, Burkina Faso, Georgia, Kazakhstan, Niger, Samoa, San Marino and Venezuela) ratified the CTBT. As of 31 December 2002, the Treaty had 166 signatures and 97 ratifications, including 31 by States listed in Annex 2. The overall status of signatures and ratifications since the Treaty was opened for signature on 24 September 1996 is summarized in Table 6.

As of 31 December 2002, 80 States had notified the Commission of their designation of National Authorities, or focal points, in accordance with the provisions of Article III, paragraph 4, of the Treaty.

Table 6.
Signatures and Ratifications by Year

	1996	1997	1998	1999	2000	2001	2002	Total
Signatures	138	11	2	4	5	5	1	**166**
Ratifications	1	7	18	25	18	20	8	**97**

Relations with States

The Executive Secretary and staff pursued contacts with States through bilateral visits and interaction with their Permanent Missions in Vienna, Bonn, Brussels, Geneva, New York and Washington, D.C., as well as in the framework of multilateral fora. In this context, the Executive Secretary visited Australia, Botswana, the Democratic Republic of the Congo, Fiji, Guatemala, Haiti, the Holy See, Italy, Jamaica, Japan, Kazakhstan, Kenya, Kyrgyzstan, Mauritius, Nigeria, the Philippines, Romania, Tonga, Uzbekistan and Yugoslavia. PTS staff undertook missions to Cameroon, Cape Verde, Ethiopia, the Libyan Arab Jamahiriya, Mauritania, South Africa, Togo and Zambia. As in previous years, the Executive Secretary wrote letters encouraging early signature and ratification to Foreign Ministers of States that had not yet signed or ratified the CTBT, before the annual session of the United Nations General Assembly.

The Executive Secretary also met in Vienna with the Vice-Presidents of El Salvador, Guatemala, Honduras and the Islamic Republic of Iran, the Foreign Ministers of Austria, Kazakhstan and Nigeria, the State Minister of Research and Technology of Indonesia, the Minister of Science and Technology of Cameroon and the Minister of Economy of Nicaragua.

Relations with International Organizations

The PTS continued to develop contacts with relevant international organizations and fora. The Executive Secretary addressed the fifty-seventh session of the United Nations General Assembly and the forty-sixth session of the General Conference of the International Atomic Energy Agency (IAEA). PTS staff participated in the first session of the Preparatory Committee for the 2005 Review Conference of the States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in New York; the seventh session of the Conference of the States Parties to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (CWC) in The Hague; the thirty-second session of the General Assembly of the Organization of American States (OAS) in Barbados; the thirty-eighth session of the Summit of the Organization of African Unity (OAU) and the Inaugural Ceremony of the African Union (AU) in Durban; the thirty-third Pacific Island Forum (PIF) in Suva, Fiji; and the fifteenth anniversary of the United Nations Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean (UN-LiREC) in Lima.

The PTS further developed its contacts with relevant regional organizations such as the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL), the Association of Caribbean States (ACS), the Association of Southeast Asian Nations (ASEAN), the Commonwealth, the European Union (EU), the League of Arab States, the Economic Community of West African States (ECOWAS) and the Southern African Development Community (SADC). The Executive Secretary was visited by the Secretary General of OPANAL and the United Nations Under-Secretary-General for Disarmament Affairs.

INTERNATIONAL COOPERATION

The PTS continued to assist in promoting cooperation among States Signatories to facilitate exchanges relating to technologies used in the verification of the Treaty. Throughout 2002, internal coordination was developed to provide States Signatories with the most efficient and effective international cooperation services.

Training Coordination

For the purpose of increasing training coordination, a wide ranging consultation process was carried out, both within the PTS and with States Signatories, on appropriate policy and procedural adjustments. The PTS continued to strengthen the capacity of the database on training programmes and workshops convened by the PTS so as to create and maintain a central registry for training, trainees and workshop participants.

Voluntary Contributions

The Government of the Netherlands offered a voluntary contribution for 2002, through the PTS, in support of both international cooperation activities and the establishment of the global verification regime. The contribution was used to fund two information visit programmes organized by the PTS in Vienna, in which four senior experts from Cameroon and Egypt participated. Norway hosted a visit by the experts from Egypt to NORSAR.

The PTS cooperated with the Japanese authorities in connection with the selection of participants for the training programme on global seismological observation offered by Japan to developing States from October to December 2002. Ten experts from 10 States Signatories from all six geographical regions took part in the programme.

The Government of Finland offered to provide the UniSampo software for radionuclide analysis free of charge in support of NDC establishment and operation.

Workshops and Seminars

In cooperation with the Government of the United Kingdom, the PTS organized a Senior Experts' Discussion on Civil and Scientific Applications of CTBT Verification Technologies, which was held in

Participants of Senior Experts' Discussion, London, May 2002.

Participants of Nairobi workshop, June 2002.

London from 9 to 10 May 2002. Fifteen senior experts from 13 States Signatories participated in the event. In addition to the final report, a booklet comprising all material presented at the discussion was printed and distributed to States Signatories. The PTS cooperated with the Permanent Missions of Australia, Japan, the Netherlands and the United Kingdom in organizing a follow-up Seminar on the Civil and Scientific Applications of the Treaty's Verification Technologies, which took place in the VIC on 15 October 2002, and in producing an information leaflet for the event.

At the invitation of the Government of Kenya, an international cooperation workshop for States from East and Southern Africa was held in Nairobi from 18 to 20 June 2002. Forty-four representatives from 20 States, including 4 non-signatory States, participated. In addition to the final report, a booklet comprising all workshop material was printed and distributed to States Signatories.

At the invitation of the Government of Jamaica, a Workshop on CTBTO International Cooperation and National Implementation of the Treaty for the Caribbean States was convened in Saint Ann from 3 to 5 December 2002. Twenty-eight participants from 15 Caribbean States, including 3 non-signatory States, attended.

Support for National Seminars and NDC Establishment

In response to a request from the Government of Azerbaijan, the PTS supported a national seminar on the CTBT for relevant Azerbaijani authorities, held in Baku from 4 to 6 June 2002.

In support of NDC establishment, computer hardware and software were donated to one African State. Close interaction with a number of other States concerning similar support continued.

LEGAL SERVICES

IMS Facility Agreements or Arrangements and Interim Exchanges of Letters

IMS facility agreements and arrangements regulate the activities of the Commission on the territory of host States, including the conduct of site surveys, installation or upgrade work, the certification of facilities and provisional O&M. Four new IMS facility agreements were concluded in 2002 (with the Czech Republic, Guatemala, Norway and Palau), bringing the total number of concluded agreements or arrangements to 23 out of a possible total of 90. Of these, as shown in Table 7, 15 have entered into force and 2 are being applied provisionally.

In addition, two interim exchanges of letters were completed in 2002, authorizing the Commission to undertake activities in States hosting IMS monitoring facilities, pending the conclusion of a formal facility agreement or arrangement. At the end of the year, appropriate legal arrangements were in place for 309 facilities in 76 countries.

Table 7. States with Which IMS Facility Agreements or Arrangements Have Been Concluded

Argentina[a]	Jordan	Senegal[b]
Australia	Kenya	South Africa
Canada	Mongolia	Spain[b]
Cook Islands	New Zealand	Sri Lanka[a]
Czech Republic[a]	Niger	Ukraine
Finland	Norway	United Kingdom[a]
France[a]	Palau	Zambia
Guatemala[a]	Peru	

[a] Agreement or arrangement has not yet entered into force.
[b] Agreement is being applied provisionally.

1986 Vienna Convention on the Law of Treaties

Following the example of the United Nations and other international organizations, the Commission acceded to the 1986 Vienna Convention on the Law of Treaties between States and International Organizations or between International Organizations on 11 June 2002.

Relationship Agreement with OPANAL

The Agreement between the Preparatory Commission and the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, which was approved by the Commission at its Eighteenth Session, was signed by the Executive Secretary of the Commission and the Secretary General of OPANAL in Vienna on 18 September 2002 and entered into force on that date. This was the first cooperation agreement that the Commission has concluded with a regional organization.

Host Country Agreements for Technical Meetings of the Commission

During the year the Commission concluded 18 agreements or arrangements for technical meetings held in Austria (3), Canada (2), China (2), Finland (2), France, Jamaica, Kazakhstan, Kenya, Norway, the United Kingdom and the USA (3).

National Implementation Measures

In 2002, a programme of legislative advice and assistance to States in implementing the CTBT at the national level was developed in accordance with Article III of the Treaty.

PUBLIC INFORMATION

Public information activities in 2002 included the launch of the Commission's new corporate identity and the development of a mission statement. In addition, a large number of information materials were produced for a variety of outreach activities and over 7400 were distributed. Regular briefings and presentations were given. The PTS participated in the United Nations Communications Group meeting in June in Rome, and in meetings of the expert group for the United Nations Study on Disarmament and Non-Proliferation Education in July and October in New York. A reception hosted by the PTS and the City of Vienna to mark the sixth anniversary of the opening for signature of the Treaty was held at the Vienna City Hall on 24 September 2002.

Corporate Identity

The new corporate identity, launched on 18 March 2002, has enhanced the image of the Commission and is being applied to different media and products.

Web Site, Publications and Outreach Materials

The public web site was redesigned to reflect the new corporate identity and was updated frequently throughout the year. A new "Legal resources" section was added to the web site. In addition to the regular updating and reprinting of materials, the *Objectives and Activities* leaflet and the *Basic Facts* series were produced in both French and Spanish. Nine issues of *CTBTO News* were published. A highlight for 2002 was the production of the first issue of the biannual newsletter *CTBTO Spectrum* in November, which introduces the Treaty and the work of the Commission to a wider audience.

1

2

3

1. Home page of the Commission's web site.
2. CTBTO Spectrum.
3. Display panel.

Press Releases, Briefings and Interviews

Press releases on subjects ranging from the latest Treaty ratification to developments in the establishment of the IMS were issued on a regular basis. The PTS adopted a new policy on press releases in order to enhance information to States Signatories on important developments in the work of the Commission.

Briefings on the Treaty and the work of the Commission were given and enquiries from the press fielded. Arrangements were made for interviews with the Executive Secretary conducted by, inter alia, Radio Africa International, the news agency Reuters and Austrian television.

INTERNAL AUDIT

The PTS prepared audit reports on payroll related transactions, CIF contracts and reduced assessment claims, and inventory control and the Asset Management System. The PTS also began audits on the GCI contract and subsequent amendments thereto, the DOTS project and education grants. The PTS reviewed the status of implementation of recommendations contained in the internal audit reports on consultants and rental subsidy.

In response to specific requests, advisory opinions and comments were submitted on the retroactivity of rental subsidy claims, compensation for heavy duty travel, the report of an external consultancy firm on human resources issues in the PTS, and implementation of a decision by the Administrative Tribunal of the International Labour Organization.

By way of assistance to the External Auditor, the PTS reviewed bank reconciliation statements to determine the accuracy of cash in bank balances as of 31 December 2001 and followed up on the actions taken by management with regard to the recommendations contained in the 2001 report and management letter of the External Auditor.

Supplementary Information

States Whose Ratification is Required for the Treaty to Enter into Force (31 December 2002)

41 Signed 31 Ratified 3 Not signed

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

Status of Signature and Ratification of the Treaty (31 December 2002)

166 Signed 97 Ratified 27 Not signed

State	Date of Signature	Date of Ratification
Afghanistan		
Albania	27 Sep. 1996	
Algeria	15 Oct. 1996	
Andorra	24 Sep. 1996	
Angola	27 Sep. 1996	
Antigua and Barbuda	16 Apr. 1997	
Argentina	24 Sep. 1996	4 Dec. 1998
Armenia	1 Oct. 1996	
Australia	24 Sep. 1996	9 Jul. 1998
Austria	24 Sep. 1996	13 Mar. 1998
Azerbaijan	28 Jul. 1997	2 Feb. 1999
Bahamas		
Bahrain	24 Sep. 1996	
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	
Benin	27 Sep. 1996	6 Mar. 2001
Bhutan		
Bolivia	24 Sep. 1996	4 Oct. 1999
Bosnia and Herzegovina	24 Sep. 1996	
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	
Canada	24 Sep. 1996	18 Dec. 1998
Cape Verde	1 Oct. 1996	
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	
Costa Rica	24 Sep. 1996	25 Sep. 2001
Côte d'Ivoire	25 Sep. 1996	
Croatia	24 Sep. 1996	2 Mar. 2001
Cuba		
Cyprus	24 Sep. 1996	
Czech Republic	12 Nov. 1996	11 Sep. 1997
Democratic People's Republic of Korea		
Democratic Republic of the Congo	4 Oct. 1996	
Denmark	24 Sep. 1996	21 Dec. 1998
Djibouti	21 Oct. 1996	
Dominica		
Dominican Republic	3 Oct. 1996	
Ecuador	24 Sep. 1996	12 Nov. 2001
Egypt	14 Oct. 1996	
El Salvador	24 Sep. 1996	11 Sep. 1998
Equatorial Guinea	9 Oct. 1996	

State	Date of Signature	Date of Ratification
Eritrea		
Estonia	20 Nov. 1996	13 Aug. 1999
Ethiopia	25 Sep. 1996	
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		
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	
Holy See	24 Sep. 1996	18 Jul. 2001
Honduras	25 Sep. 1996	
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	
Kyrgyzstan	8 Oct. 1996	
Lao People's Democratic Republic	30 Jul. 1997	5 Oct. 2000
Latvia	24 Sep. 1996	20 Nov. 2001
Lebanon		
Lesotho	30 Sep. 1996	14 Sep. 1999
Liberia	1 Oct. 1996	
Libyan Arab Jamahiriya	13 Nov. 2001	
Liechtenstein	27 Sep. 1996	
Lithuania	7 Oct. 1996	7 Feb. 2000
Luxembourg	24 Sep. 1996	26 May 1999
Madagascar	9 Oct. 1996	
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	
Mauritius		
Mexico	24 Sep. 1996	5 Oct. 1999
Micronesia (Federated States of)	24 Sep. 1996	25 Jul. 1997
Monaco	1 Oct. 1996	18 Dec. 1998
Mongolia	1 Oct. 1996	8 Aug. 1997
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	

State	Date of Signature	Date of Ratification
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	
Pakistan		
Palau		
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
Republic of Moldova	24 Sep. 1997	
Romania	24 Sep. 1996	5 Oct. 1999
Russian Federation	24 Sep. 1996	30 Jun. 2000
Rwanda		
Saint Kitts and Nevis		
Saint Lucia	4 Oct. 1996	5 Apr. 2001
Saint Vincent and the Grenadines		
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 and Montenegro (formerly Yugoslavia)	8 Jun. 2001	
Seychelles	24 Sep. 1996	
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		
Suriname	14 Jan. 1997	
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
Togo	2 Oct. 1996	
Tonga		
Trinidad and Tobago		
Tunisia	16 Oct. 1996	
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

State	Date of Signature	Date of Ratification	State	Date of Signature	Date of Ratification
United Kingdom	24 Sep. 1996	6 Apr. 1998	Vanuatu	24 Sep. 1996	
United Republic of Tanzania			Venezuela	3 Oct. 1996	13 May 2002
United States of America	24 Sep. 1996		Viet Nam	24 Sep. 1996	
Uruguay	24 Sep. 1996	21 Sep. 2001	Yemen	30 Sep. 1996	
Uzbekistan	3 Oct. 1996	29 May 1997	Zambia	3 Dec. 1996	
			Zimbabwe	13 Oct. 1999	

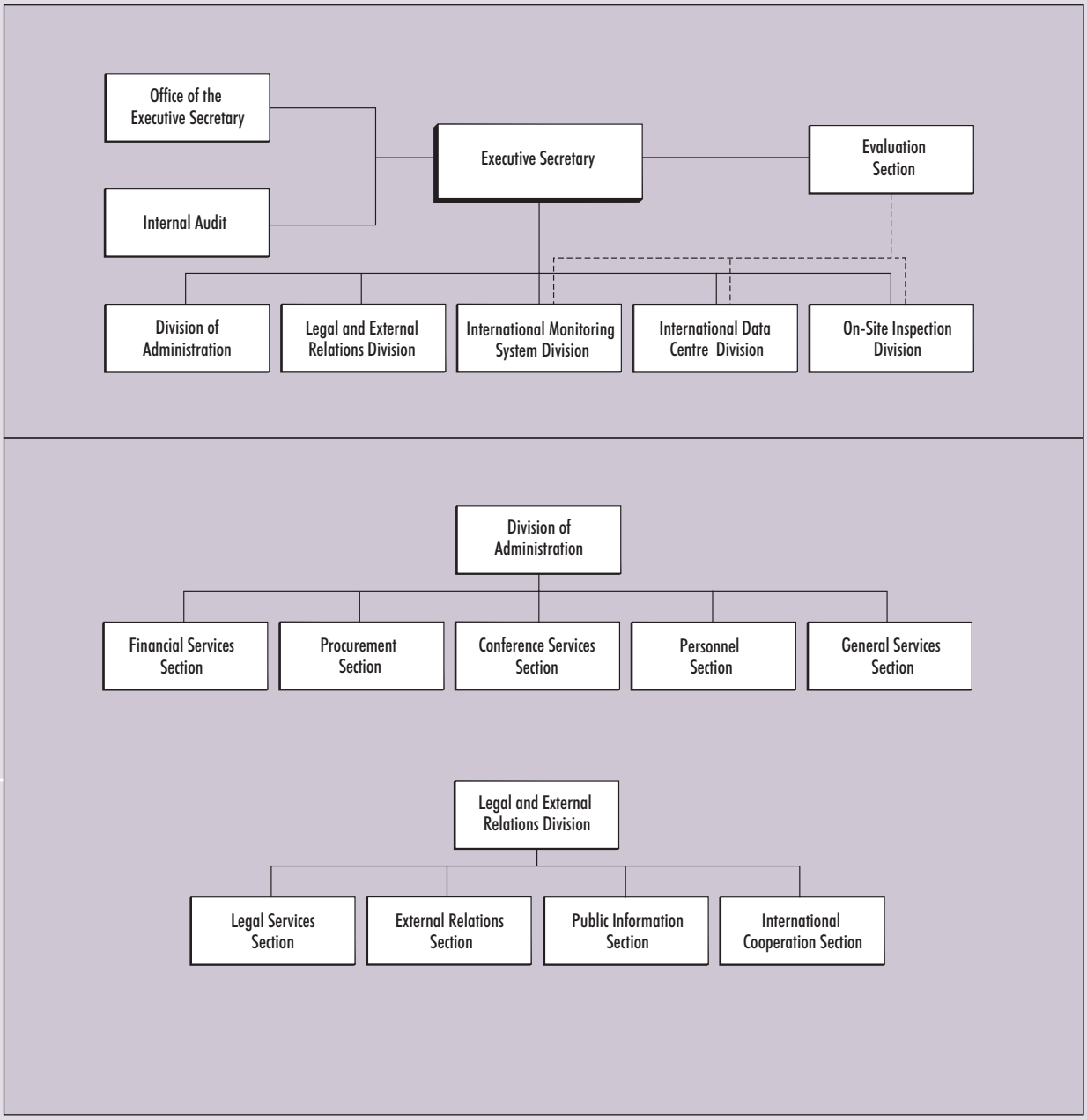
Facilities of the CTBT International Monitoring System

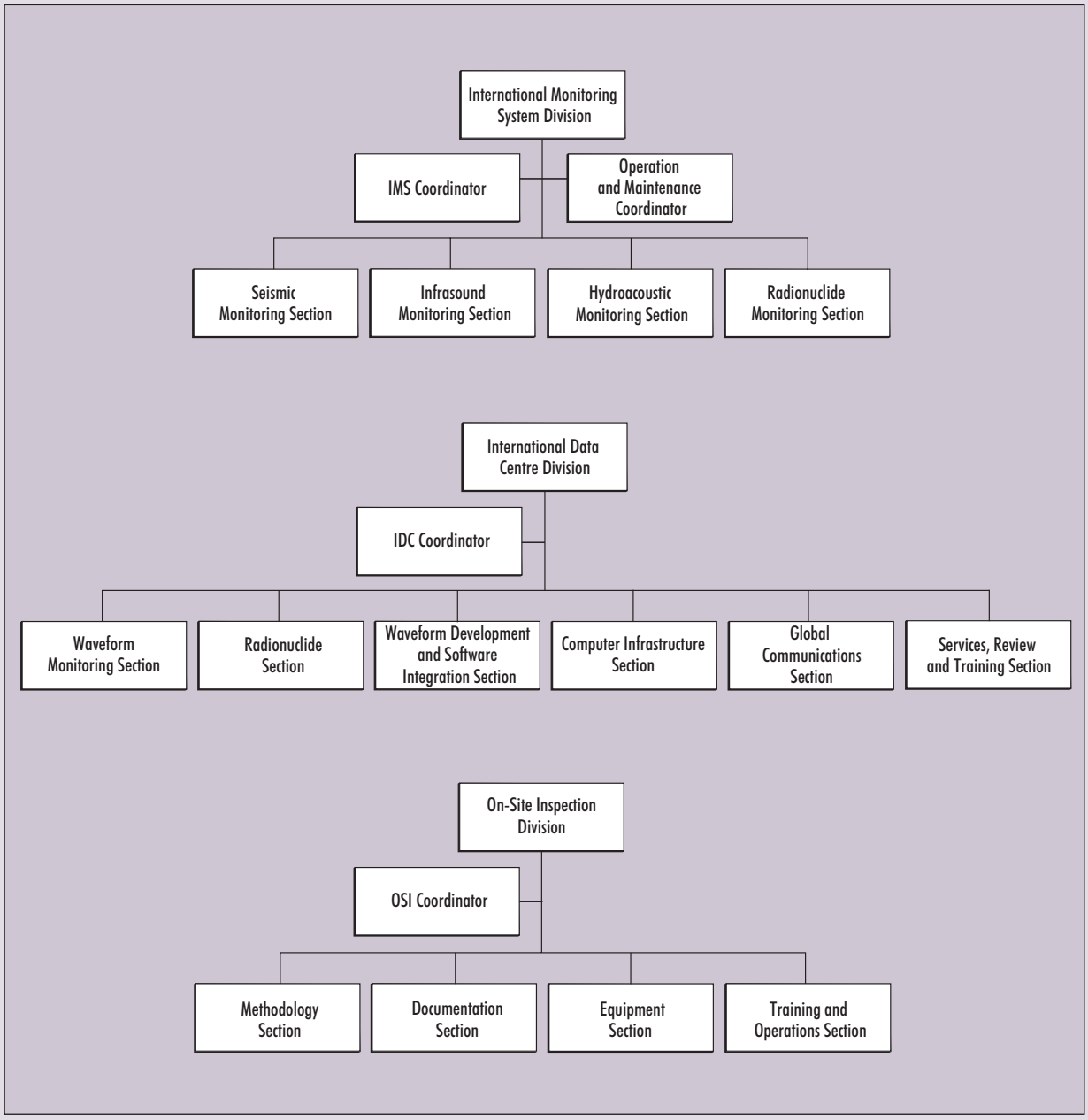
Primary seismic stations | Auxiliary seismic stations | Radionuclide stations | Radionuclide laboratories | Hydroacoustic stations | Infrasound stations

State	PS	AS	RN	RL	HA	IS	Total	State	PS	AS	RN	RL	HA	IS	Total
Argentina	1	2	3	1		2	9	Madagascar		1				1	2
Armenia		1					1	Malaysia			1				1
Australia	4	3	7	1	1	5	21	Mali		1					1
Austria				1			1	Mauritania			1				1
Bangladesh		1					1	Mexico		3	1		1		5
Bolivia	1	1				1	3	Mongolia	1		1			1	3
Botswana		1					1	Morocco		1					1
Brazil	1	2	2	1		1	7	Namibia		1				1	2
Cameroon			1				1	Nepal		1					1
Canada	3	6	4	1	1	1	16	New Zealand		3	2	1		1	7
Cape Verde						1	1	Niger	1		1				2
Central African Republic	1					1	2	Norway	2	2	1			1	6
Chile		2	2		1	2	7	Oman		1					1
China	2	4	3	1		2	12	Pakistan	1					1	2
Colombia	1						1	Palau						1	1
Cook Islands		1	1				2	Panama			1				1
Costa Rica		1					1	Papua New Guinea		2	1			1	4
Côte d'Ivoire	1					1	2	Paraguay	1					1	2
Czech Republic		1					1	Peru		2					2
Denmark		1				1	2	Philippines		2	1				3
Djibouti		1				1	2	Portugal			1		1	1	3
Ecuador			1			1	2	Republic of Korea	1						1
Egypt	1	1					2	Romania		1					1
Ethiopia		1	1				2	Russian Federation	6	13	8	1		4	32
Fiji		1	1				2	Samoa		1					1
Finland	1			1			2	Saudi Arabia	1	1					2
France	1	2	6	1	2	5	17	Senegal		1					1
Gabon		1					1	Solomon Islands		1					1
Germany	1		1			2	4	South Africa	1	1	1	1		1	5
Germany and								Spain	1						1
South Africa[a]		1					1	Sri Lanka		1					1
Greece		1					1	Sweden		1	1				2
Guatemala		1					1	Switzerland		1					1
Iceland		1	1				2	Thailand	1		1				2
To be determined	1	1	1			1	4	Tunisia	1					1	2
Indonesia		6					6	Turkey	1						1
Iran								Turkmenistan	1						1
(Islamic Republic of)	1	2	1			1	5	Uganda		1					1
Israel		2		1			3	Ukraine	1						1
Italy		1		1			2	United Kingdom		1	4	1	2	4	12
Japan	1	5	2	1		1	10	United Republic							
Jordan		1					1	of Tanzania			1				1
Kazakhstan	1	3				1	5	United States							
Kenya	1					1	2	of America	5	12	11	1	2	8	39
Kiribati			1				1	Venezuela		2					2
Kuwait			1				1	Zambia		1					1
Kyrgyzstan		1					1	Zimbabwe		1					1
Libyan Arab															
Jamahiriya			1				1	**Total**	**50**	**120**	**80**	**16**	**11**	**60**	**337**

[a]Germany and South Africa will be jointly responsible for an auxiliary seismic station in Antarctica.

Organizational Structure of the Provisional Technical Secretariat (31 December 2002)




International Monitoring System Division
IMS Coordinator
Operation and Maintenance Coordinator
Seismic Monitoring Section
Infrasound Monitoring Section
Hydroacoustic Monitoring Section
Radionuclide Monitoring Section
International Data Centre Division
IDC Coordinator
Waveform Monitoring Section
Radionuclide Section
Waveform Development and Software Integration Section
Computer Infrastructure Section
Global Communications Section
Services, Review and Training Section
On-Site Inspection Division
OSI Coordinator
Methodology Section
Documentation Section
Equipment Section
Training and Operations Section