

# Annual Report 2004



# Annual Report 2004

---

# 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 Twenty-Fourth Session of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization. It gives an account as of 31 December 2004 of the activities undertaken by the Provisional Technical Secretariat of the Commission during 2004 in implementation of the seven Major Programmes.



## 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 2004, which shows further substantial progress in all aspects of establishing the Treaty verification regime and preparing for the entry into force of the Treaty.

During 2004, considerable resources were dedicated to activities associated with operation and maintenance (O&M) of the entire Treaty monitoring system. These activities included the preparatory phase (phase I) of the first progressive system-wide performance test (SPT1), which was carried out to test and assess the tools and methods to be used in the 2005 performance testing phase (phase II). The O&M workshop in October in Baden, Austria, attracted the highest number of participants of all workshops organized by the PTS so far and generated useful discussions on station O&M, sustainability and development, system performance and training. The PTS has been dealing with increasing O&M related workloads by focusing on coordination of efforts throughout the organization.

Significant advances were made in the establishment of the International Monitoring System (IMS), which consists of a worldwide network of 321 seismic, hydro-acoustic, infrasound and radionuclide stations and 16 radionuclide laboratories. During 2004, a further 40 stations and 1 radionuclide laboratory were certified as meeting the technical requirements of the Commission. This means that at the end of the year there were 119 stations and 5 laboratories certified. Moreover, an additional 86 stations have been installed and thus 64% of the network is installed and essentially meets the specifications of the Commission. States hosting these facilities continued their valuable cooperation with the Commission. At present, appropriate legal arrangements are in place for 324 facilities in 82 countries.

The International Data Centre (IDC) in Vienna received, analysed, reported on and archived the waveform and radionuclide data from a growing number of IMS stations. On the part of States Signatories, around 85 National Data Centres had been established by the end of 2004 and a total of 668 users from these States Signatories had been authorized to access IMS data and IDC products. In addition, the development of processing software for all verification technologies proceeded as planned and preparations began for the relocation of the computer centre. The coverage of the Global Communications Infrastructure continued to expand throughout 2004, with 29 new very small aperture satellite terminals (VSATs) installed.

FOREWORD BY  
THE EXECUTIVE SECRETARY

During the year, there was also encouraging progress in on-site inspection (OSI) related activities. In 2004, the PTS began implementing the recommendations made by an external evaluation team in the previous year, including the development of an OSI strategic plan, so that the build-up of the OSI regime could be accelerated to catch up with other parts of the verification system.

Activities in 2004 to support the verification regime as well as to promote the understanding of the Treaty, such as training courses and workshops, were held around the world with the participation of more than 95 States. I am grateful to Australia, Austria, Finland, Indonesia, Italy, Japan, the Russian Federation, Senegal, Slovakia, South Africa, Tunisia, the United Kingdom and Venezuela (Bolivarian Republic of) for successfully hosting these events.

While the purpose of the verification regime is to ensure compliance with the Treaty, the verification technologies are also useful for civil and scientific purposes. As a result of the tragic devastation caused by the tsunami in the Indian Ocean in December 2004, scientific and disaster alert communities are expressing greater interest in IMS data and IDC products, which could be of significant value for a variety of studies and disaster alert purposes, and would benefit not only individual States but also humankind as a whole. The Commission has been considering possible ways to support disaster alert activities. During the year, an experts' discussion on civil and scientific applications of CTBT verification technologies, organized by the Governments of Germany and Japan, was held in Berlin and was attended by experts from 10 States Signatories. The PTS would be pleased to continue to support endeavours of this nature.

In the course of 2004, more signatures and ratifications of the Treaty were achieved. As of 31 March 2005, the CTBT had 175 signatures and 120 ratifications. Thus the Treaty is moving closer to attaining 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 22 to 24 September this year in New York. 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 2005.

Wolfgang Hoffmann  
Executive Secretary

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

Vienna  
April 2005

## Contents

<b>Joint Programmatic Activities</b> .....	1
COORDINATION OF OPERATION AND MAINTENANCE .....	2
SYSTEM-WIDE PERFORMANCE TEST .....	2
JOINT IMS AND IDC TRAINING COURSES .....	3
<b>Major Programme 1:</b>	
<b>International Monitoring System</b> .....	5
IMS ESTABLISHMENT .....	6
OPERATION AND MAINTENANCE WORKSHOP .....	10
INTEGRATED LOGISTICS SUPPORT STUDY .....	10
CONFIGURATION AND INFORMATION MANAGEMENT .....	10
DEVELOPMENT OF THE IMS REPORTING SYSTEM .....	10
TRAINING .....	11
OPERATIONS CONTRACTS .....	11
<b>Major Programme 2:</b>	
<b>International Data Centre</b> .....	13
MANAGEMENT, COORDINATION AND TRAINING .....	15
PROCESSING AND ANALYSIS .....	17
SOFTWARE DEVELOPMENT .....	20
COMPUTER INFRASTRUCTURE .....	22
<b>Major Programme 3:</b>	
<b>Communications</b> .....	23
GCI MANAGEMENT .....	24
PROCUREMENT OF THE NEXT GENERATION OF THE GCI .....	24
GCI IMPLEMENTATION .....	25
OPERATION AND MAINTENANCE .....	27
<b>Major Programme 4:</b>	
<b>On-Site Inspection</b> .....	29
OSI STRATEGIC PLAN .....	30
OSI OPERATIONAL MANUAL, METHODOLOGY	
EXPERIMENTS, INFRASTRUCTURE AND TRAINING .....	30
OSI EQUIPMENT .....	33

## Directors of the Provisional Technical Secretariat



Mr Gerardo Suárez  
International Monitoring  
System Division



Mr Lassina Zerbo  
International Data Centre  
Division



Mr Boris Kvak  
On-Site Inspection Division

## Directors of the Provisional Technical Secretariat



Mr Pierce S. Corden  
Division of Administration



Mr Ziping Gu  
Legal and External Relations  
Division

<b>Major Programme 5:</b>	
Evaluation .....	37
EVALUATION .....	39
QUALITY ASSURANCE .....	41
WORKSHOP AND UNEG .....	41

<b>Major Programme 6:</b>	
Policy Making Organs .....	43

<b>Major Programme 7:</b>	
Administration, Coordination and Support .....	45
SUPPORT FOR MEETINGS .....	46
IMPLEMENTATION OF 2004 BUDGET .....	47
PROCUREMENT .....	48
INTERNAL AUDIT .....	48
GENERAL SERVICES .....	48
HUMAN RESOURCES MANAGEMENT .....	49
INTEGRATED MANAGEMENT INFORMATION SYSTEM .....	50
INFORMATION SECURITY .....	50
REVIEW OF THE ORGANIZATIONAL	
STRUCTURE OF THE PTS .....	51
SIGNATURES AND RATIFICATIONS .....	51
RELATIONS WITH STATES AND INTERNATIONAL ORGANIZATIONS ...	51
CIVIL AND SCIENTIFIC APPLICATIONS OF	
VERIFICATION TECHNOLOGIES .....	55
DISSEMINATION OF INFORMATION .....	55
LIAISON WITH NGOs .....	56

## Supplementary Information

States Whose Ratification is Required for the	
Treaty to Enter into Force (31 December 2004) .....	58
Status of Signature and Ratification by States Listed	
in Annex 1 to the Treaty (31 December 2004)	
Map .....	59
Table .....	60
Facilities of the CTBT International Monitoring System .....	64
Facility Agreements or Arrangements with States	
Hosting IMS Facilities (31 December 2004) .....	66
Relationship and Cooperation Agreements with	
Other International Organizations (31 December 2004) .....	67
Organizational Structure of the Provisional Technical	
Secretariat (31 December 2004) .....	68
Abbreviations .....	71



## Joint Programmatic Activities

## Joint Programmatic Activities

### COORDINATION OF OPERATION AND MAINTENANCE

In 2004, coordination throughout the Provisional Technical Secretariat (PTS) of operation and maintenance (O&M) of the whole CTBT monitoring system continued. Significant resources were dedicated to the planning, execution and analysis of the first progressive system-wide performance test (SPT1) (see “System-Wide Performance Test” below) and to the preparation and convening of an O&M workshop for station operators and National Data Centre (NDC) managers (see “Operation and Maintenance Workshop” in Major Programme 1). Development work also continued on processes and tools to monitor and report on O&M of the whole monitoring system (at remote facilities as well as in Vienna) and to support the physical infrastructure. An Integrated Logistics Support (ILS) study (see “Integrated Logistics Support Study” in Major Programme 1) provided a critical assessment of the current ILS activities of the PTS and valuable inputs to the strategic planning of the O&M process. In addition, newly developed processes, such as a joint daily operations meeting involving Sections of the International Monitoring System (IMS) and International Data Centre (IDC) Divisions, including the Global Communications Section, and the Global Communications Infrastructure (GCI) contractor, were created. A coherent framework was established for documenting O&M procedures and processes throughout the IMS and IDC Divisions.



*Daily operations meeting.*

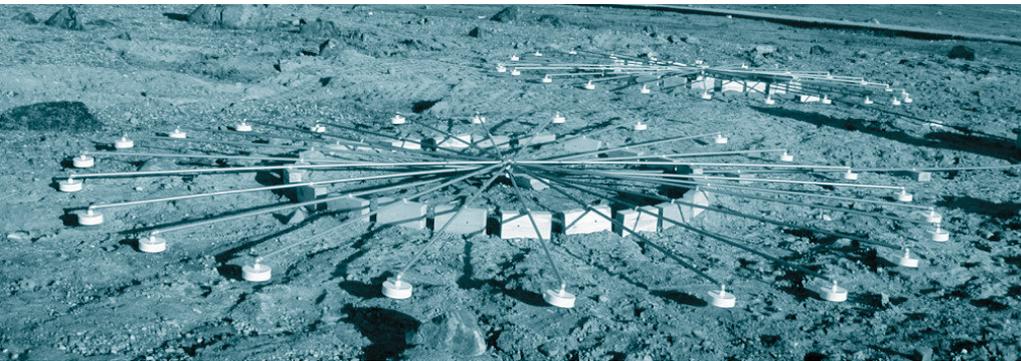
### SYSTEM-WIDE PERFORMANCE TEST

The preparatory phase (phase I) of SPT1 was carried out in May–June 2004 to test and assess the tools and methods to be used in the 2005 performance testing phase (phase II). Coordinated consideration was given to the elements of the verification system, the established O&M procedures for IMS stations, communication links, IDC operations and performance metrics for establishing an IMS/GCI/IDC system-wide performance. In particular, it involved the examination of the system-wide response to specific failures of selected components of the IMS/GCI/IDC system and reporting on the findings from phase I. The elaboration of failure scenarios and the estimation of their possible impacts on all areas of the system provided a critical review of current O&M procedures and failure mode effects. The analysis of the data recorded during the test in phase I required

significant effort and highlighted factors contributing to low performance. The analysis also demonstrated that in order to efficiently provide a continuous assessment of the performance of the system, a sustained effort in the development of system-wide reporting and state of health monitoring tools and procedures was required.

### **JOINT IMS AND IDC TRAINING COURSES**

In 2004, three training courses were jointly organized by the IMS and IDC Divisions: an introductory course for station operators and NDC managers (Vienna, 8–12 March); and two regional technical courses for station operators and NDC technical staff members (Obninsk, Russian Federation, 12–18 May, and Caracas, 7–13 June). The two regional training courses included a special programme for station operators and NDC staff.



# Major Programme 1: International Monitoring System

## Major Programme 1: International Monitoring System

During 2004, significant progress towards the completion of the IMS took place. Further build-up occurred in all four technologies (seismic, hydroacoustic, infrasound and radionuclide). Installations were completed at 29 additional stations. A further 40 stations and 1 radionuclide laboratory were certified as meeting the technical requirements of the Preparatory Commission, bringing the total number of certified stations to 119 (29 primary seismic, 29 auxiliary seismic, 6 hydroacoustic, 24 infrasound and 31 radionuclide stations) and the total number of certified radionuclide laboratories to 5. This equates to 45% of the primary IMS stations (primary seismic stations and hydroacoustic, infrasound and radionuclide stations), 24% of the auxiliary seismic stations and 31% of the radionuclide laboratories. Altogether, at the end of 2004, 204 stations (64%) were either certified or were installed and substantially met specifications.

In order to better align the technology Sections in the IMS Division, the Infrasound Monitoring and Hydroacoustic Monitoring Sections were fused into a single Acoustic Monitoring Section. To ensure that expertise remains in each specific technology, there is an Infrasound Monitoring Unit and a Hydroacoustic Monitoring Unit within the Acoustic Monitoring Section.

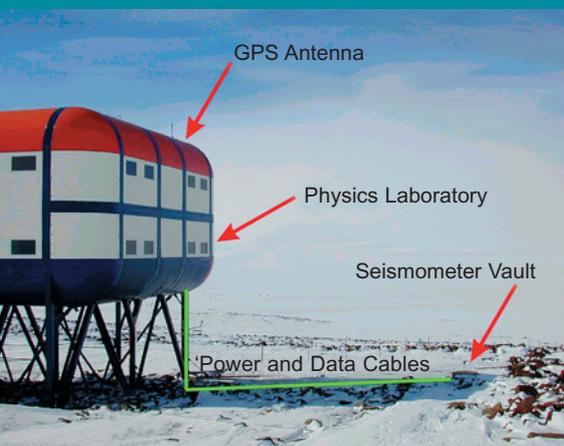
Development by the PTS of the provisional O&M process and procedures continued in 2004. The PTS-wide effort is being managed by the “Coordination for Provisional IMS Operation and Maintenance” group under the Director of the IMS Division. In November 2004, a minor adjustment was made to the structure of the renamed Provisional O&M Coordination. While the O&M Coordinator continues to focus on higher level planning, decision making and coordination functions, the responsibility for implementation and oversight of IMS O&M projects has been given to an O&M Support Group.

### IMS ESTABLISHMENT

A summary of the status of the establishment of the IMS in each of the monitoring technologies is presented below.



*Auxiliary seismic station AS35, SANAE Station, Antarctica (Germany/South Africa).*



*Close-up of auxiliary seismic station AS35.*

**Table 1. Status of the Primary Seismic and Hydroacoustic, Infrasound and Radionuclide Station Installation Programme as of 31 December 2004**

IMS Station Type	Installation Complete		Under Construction	Contract Under Negotiation	Not Started
	Certified	Not Certified			
Primary seismic	29	3	9	5	4
Hydroacoustic	6	1	3	1	0
Infrasound	24	6	8	5	17
Radionuclide	31	10	13	8	18
<b>Total</b>	<b>90</b>	<b>20</b>	<b>33</b>	<b>19</b>	<b>39</b>

**Table 2. Status of the Auxiliary Seismic Station Installation Programme as of 31 December 2004**

IMS Station Type	Installation Complete/ Substantially Meets Specifications		Under Construction	Contract Under Negotiation	Not Started
	Certified	Not Certified			
Auxiliary seismic	29	65	8	11	7

## Seismological Monitoring System

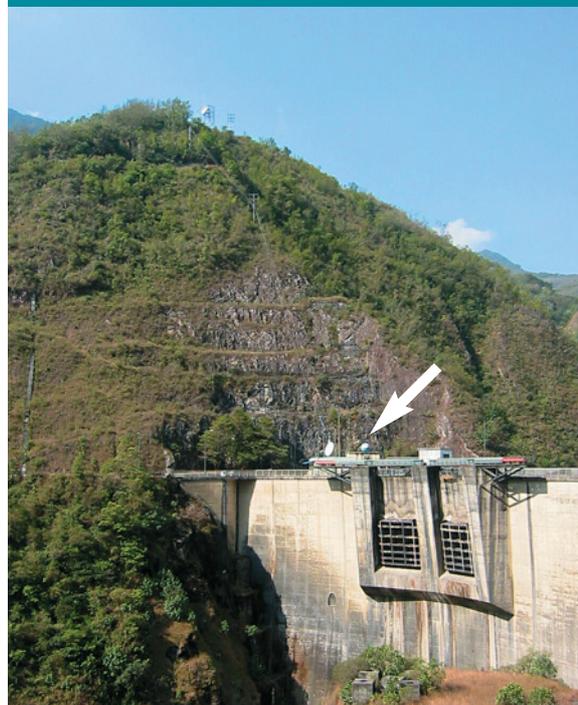
The seismic monitoring network includes both primary and auxiliary stations. The primary stations provide continuous data to the IDC, whereas the auxiliary stations provide data segments to the IDC when requested. Significant progress was made in the network in 2004, with 22 more stations certified. This brings the total number of certified primary seismic stations to 29, or 58% of the primary seismic network, while a total of 29 auxiliary seismic stations, or 24% of the auxiliary seismic network, have also now been certified.

In the primary seismic network, 4 stations were certified in 2004, site preparation and installation were completed for 2 stations and construction of 9 more was under way.

In the auxiliary seismic monitoring programme, site preparation and installation were completed for 7 stations and 19 other stations were connected to the IDC. Further, site preparation and/or installation was in progress for 8 stations. Eighteen more stations were certified during 2004.



*Primary seismic station PS50, Vanda, Antarctica (USA).*



*Auxiliary seismic station AS117, Santo Domingo, Venezuela (Bolivarian Republic of).*

## MAJOR PROGRAMME 1: INTERNATIONAL MONITORING SYSTEM

### Hydroacoustic Monitoring System

Further progress was achieved in the establishment and operation of the hydroacoustic monitoring network. An additional hydrophone based station was certified and by the end of the year 55% of the network had been certified.

One part of the hydroacoustic network comprises hydrophone based stations, for which the Treaty specifies a total of six stations. One of these stations was installed in 2004, bringing the total installed to five. The newly installed station was also certified, giving a total of four certified hydrophone based stations. A proposal was received and contract negotiations commenced for manufacture and installation of the sixth and final hydrophone station.

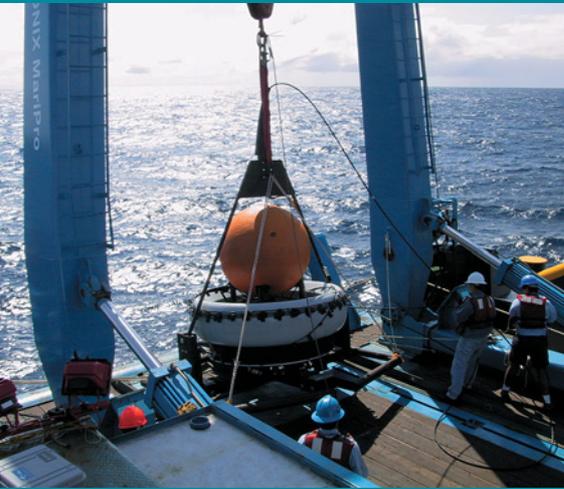
The second part of the hydroacoustic network is based on T phase stations, for which the Treaty provides for a total of five stations. One of these stations was certified in 2004, giving a total of two certified T phase stations. For two of the remaining T phase stations, installation is nearing completion. The final T phase station is a legacy station undergoing reconstruction.

### Infrasound Monitoring System

Build-up of the infrasound monitoring network accelerated during 2004. Seven more stations were certified, bringing the total number of infrasound stations certified to 24, which equates to 40% of the network. Site preparation and installation were completed for 7 stations and construction of 8 additional stations was under way in 2004.

In November–December 2004, an infrasound technology workshop was held in Hobart, Australia. Discussions focused on issues related to the use of instrumentation and analysis in the infrasound technology.

During 2004, research was conducted by the PTS in collaboration with the Department of Analysis and Surveillance of the Environment (DASE) of the French Atomic Energy Commission to develop improved infrasound stations for locations with high wind conditions. A possible candidate for later installation of such innovative infrasound technology is station IS23 (Kerguelen, France).



*Offshore deployment of acoustic equipment for hydroacoustic station HA10, Ascension, United Kingdom.*



*Infrasound station IS50, Ascension, United Kingdom.*



*Infrasound station IS14, Robinson Crusoe Island, Chile.*

## Radionuclide Monitoring System

The radionuclide monitoring network is composed of two types of station – 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 in support of the radionuclide monitoring network.

In 2004, 9 particulate stations were certified, of which 3 were manual and 6 were automatic. The number of certified radionuclide particulate stations is now 31, or 39% of the network. Installation of 12 new particulate stations was completed and construction of 13 additional particulate stations was in progress in 2004.

Station-specific operational manuals with standardized operational procedures for automatic and manual stations were completed. These manuals are now used at 17 IMS stations and will be used for any new station to be built. Work is under way to modify the existing manuals at all stations in order to allow a better quality control of the radionuclide network.

Phase IIIb of the International Noble Gas Experiment (INGE) ended in June 2004 for all installed noble gas systems in Canada, China, France (Tahiti) and Norway (see also “Radionuclide Data” in Major Programme 2). All new systems will be in Phase IIIc. One new system was installed and being tested in Germany and three new systems are soon to be installed in Argentina, the Russian Federation and Sweden. Two noble gas systems have been procured for installation in China and Mongolia. A joint radionuclide laboratory and noble gas workshop was held in Strassoldo, Italy, in August 2004. Future work for the calibration and certification of the noble gas systems was discussed together with ways in which radionuclide laboratories can support the noble gas experiment.

One radionuclide laboratory was certified in 2004. A Technical Report on the 2003 proficiency test exercise was completed and the 2004 proficiency test exercise is under way. As part of the station network quality assurance, 83 quality control samples from certified stations were sent for analysis at certified laboratories. A project was started to define the conditions and requirements for the role of radionuclide laboratories in noble gas network quality assurance. A laboratory xenon analysis exercise, in which samples are sent from station sites to laboratories for analysis, was started with three IMS radionuclide laboratories, one collaborating expert laboratory and six noble gas Phase III installations.



*Airflow measurement check of manual particulate air sampler at radionuclide station RN28 Pointe-à-Pitre, Guadeloupe, France.*



*Checking of detector during certification visit to radionuclide station RN72, Melbourne, Florida, USA.*

## MAJOR PROGRAMME 1: INTERNATIONAL MONITORING SYSTEM



*Participants of the O&M workshop in Baden, Austria, October 2004.*

### **OPERATION AND MAINTENANCE WORKSHOP**

The O&M workshop which was held from 11 to 15 October 2004 in Baden, Austria, attracted the highest number of participants of all workshops organized by the PTS so far. The active participation of 206 attendees from 53 States Signatories, including 118 station operators or NDC staff, 20 representatives of equipment providers, 60 PTS staff and 8 members of the PTS external review team, made this workshop a fruitful and successful event. The workshop consisted of presentations and discussions in parallel which ended with daily plenary sessions on four themes: station O&M, sustainability and development, system performance and training. The workshop also included discussion fora to enhance the communication between the PTS and the station operators and NDC staff, and a station certification ceremony in recognition of station operators' important contributions to the effective functioning of the IMS. Recommendations were made in several areas, including communications, contracts, finances, maintenance, coordination and O&M tools and databases.

### **INTEGRATED LOGISTICS SUPPORT STUDY**

As a result of an ILS study contracted by the PTS, recommendations were provided for an initial strategy for the long term logistical support of IMS stations. The recommendations were presented at the Twenty-Third Session of Working Group B (WGB) and at the O&M workshop. On the basis of feedback received, the PTS has started to address the recommendations and will do further work to enhance its current logistics support structure. Efforts have been initially concentrated on completing and implementing a configuration management programme.

### **CONFIGURATION AND INFORMATION MANAGEMENT**

The Database of the Technical Secretariat (DOTS) is an integrated database with custom built Web based applications to store and manage information pertinent to the PTS and the future Technical Secretariat. A third version of DOTS was completed and includes a reporting tool and additional enhancements. Sample database reports with station information were posted on the Experts Communication System.

### **DEVELOPMENT OF THE IMS REPORTING SYSTEM**

The IMS Reporting System (IRS) is the PTS tool for logging and tracking operational problems in the IMS. It supports operational communications between the PTS and station operators and is based on email, Web pages and an Oracle database. The tool was developed on the basis of the draft

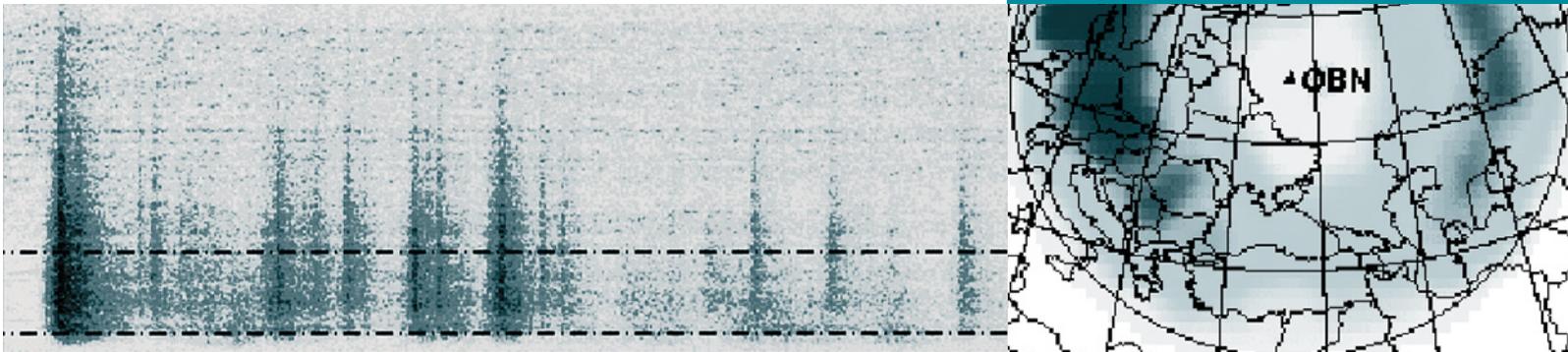
IMS Operational Manuals and PTS experience with daily operations and has proved to be very robust. In 2004, development work continued and version 3.0 was released in June.

## **TRAINING**

Two technical training programmes for radionuclide station operators were organized by the IMS Division at the Austrian Research Centers in Seibersdorf, Austria, from 15 to 19 March and from 19 to 23 July. Furthermore, a regional technical course for station operators and NDC staff was organized by the IDC Division (Dakar, 25–30 October), where 4 station operators attended. Together with joint training courses organized by the IMS and IDC Divisions (see “Joint IMS and IDC Training Courses” in Joint Programmatic Activities), in total, 51 station operators from 26 States Signatories attended one or other of these courses.

## **OPERATIONS CONTRACTS**

In 2004, the PTS concluded seven new contracts for testing and evaluation and for post-certification activities of IMS stations. The model contract developed in 2002 was being used for 81 stations by the end of the year. (See also “Procurement” in Major Programme 7.)

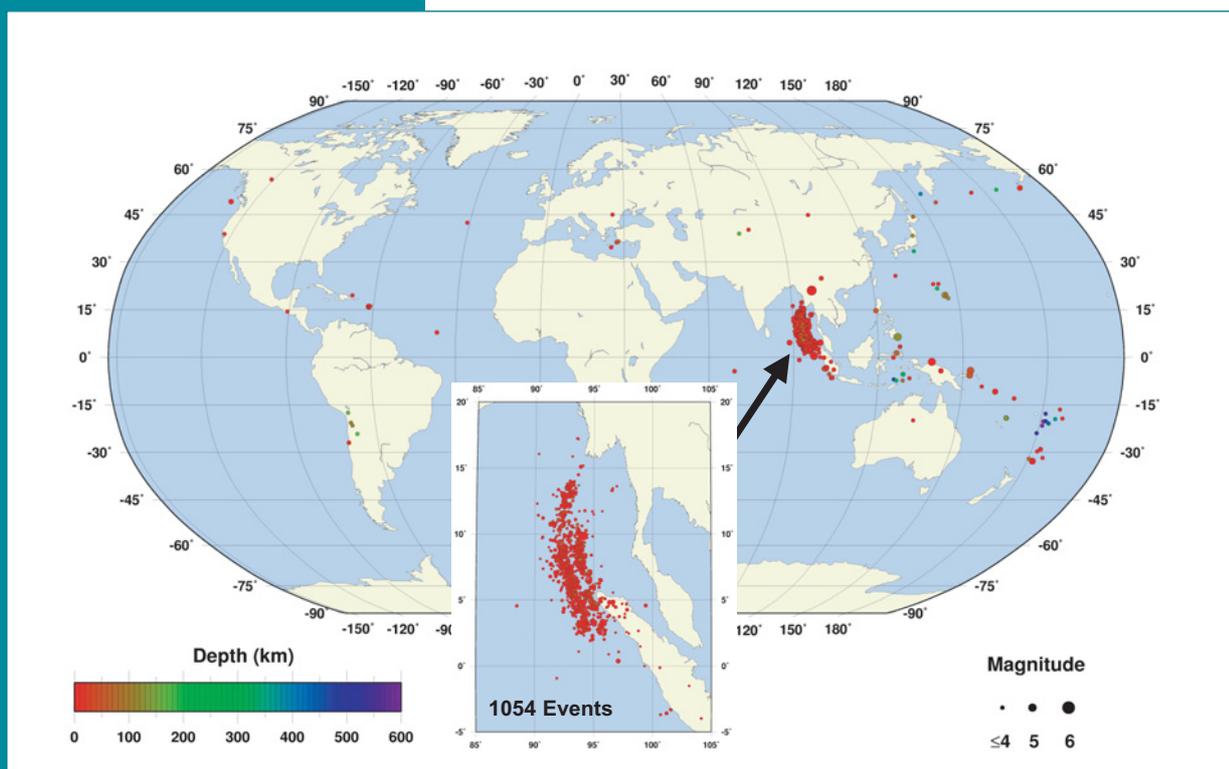


## **Major Programme 2:** International Data Centre

## Major Programme 2: International Data Centre

Build-up of the IDC progressed in 2004 under Subphase 5a of the seven phase Progressive Commissioning Plan. Upgrading and new developments in the IDC applications software continued in various areas, including software for processing infrasound data and noble gas data. During the year, 36 new or upgraded waveform monitoring stations were introduced into IDC operations; data from 108 such stations were processed continuously and contributed to Reviewed Event Bulletins (REBs). Altogether 32 radionuclide stations, including 8 new stations, contributed to the production of the Reviewed Radionuclide Report (RRR).

*Aftershocks of the Sumatra event of 26 December 2004 dominated the IDC Reviewed Event Bulletins (REBs) of 26 and 27 December. The map shows the 1137 events in the REBs for those two days, including 1054 Sumatra aftershocks (inset).*



## MANAGEMENT, COORDINATION AND TRAINING

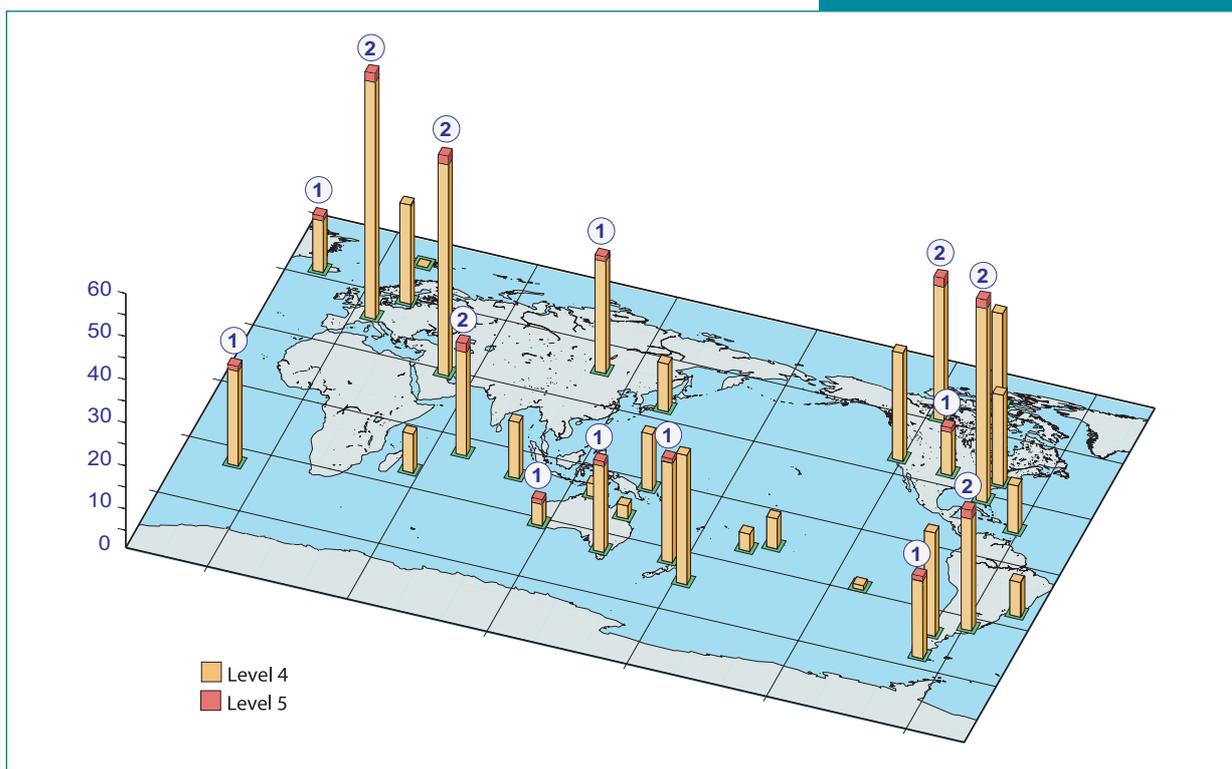
### Technical Coordination

The provision of support to States Signatories was continued through presentations describing the Treaty and the work of the PTS, the services available at the IDC and the possibilities for technology transfer. Regional workshops and seminars were organized with the International Cooperation Section to encourage the establishment of new NDCs and interaction through data exchange and participation in SPT1.

Phase 1 of the development of the new IDC web site was completed in May 2004. Requirements and system architecture design specifications were established, reviewed and accepted, along with an electronic storyboard as a visualization of the developed web site concept and an implementation plan proposal.

In 2004, the project office pursued its goal to establish a professional project management culture in the IDC Division by establishing standards and guidelines. In addition, all project related documentation was made available on the Intranet.

*Numbers of Level 4 and Level 5 radionuclide events (shown in circles above the bars) recorded during 2004 by 24 to 32 IMS stations in IDC operations. The number of Level 4 events is much less than the number of detections of CTBT-relevant nuclides as many detections are screened out by a filter for commonly occurring nuclides.*



### Information Security

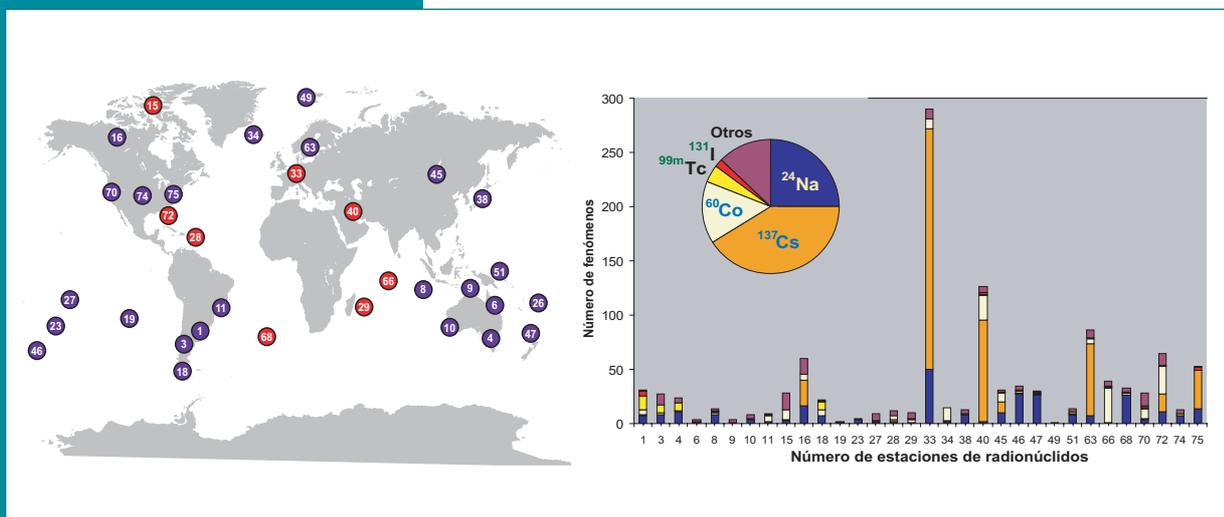
The implementation of information security measures and development of PTS policies proceeded as planned (see also “Information Security” in Major Programme 7). Network penetration tests were performed by an external contractor to verify the effectiveness of information security measures. Necessary changes, on the test bed only, were made to the Public Key Infrastructure used to authenticate IMS data.

Following recommendations from the expert group on computer technology, the IDC Division has embarked on a path towards open source software, including operating systems that would allow more independence from vendors and potential long term cost saving. For this purpose a PTS-wide task group was created and was expected to report its findings to the Twenty-Fourth Session of WGB.

### Training

IDC training courses for NDC managers and technical staff are intended to enable States Signatories to take greater advantage of IMS data and the products and services of the IDC. A revised training programme, focusing on regional training and joint IMS-IDC courses, was implemented in 2004. Eighteen persons from 16 States Signatories participated in the IDC Introductory Training Course for NDC Managers, held from 8 to 12 March in Vienna in conjunction with an IMS training course for station operators (see also “Joint IMS and IDC Training Courses” in Joint Programmatic Activities). The IDC Division organized further regional technical training courses in Dakar, from 25 to 30 October, and in Jakarta, from 8 to 14 December. With joint IMS-IDC training courses included, a total of 42 NDC technical staff members from 28 States Signatories participated in the IDC/PTS training courses.

The map on the left shows all radionuclide particulate stations operational at the end of 2004. The eight stations marked in red entered the operational system in 2004. Applying the Simulation Assisted Nuclide Review Tool, SAINT, in 2004 resulted in more detections of CTBT-relevant nuclides than in previous years. Most detections refer to three nuclides, sodium-24, caesium-137 and cobalt-60, which are primarily due to cosmic radiation or resuspension of fallout from the Chernobyl accident of 1986.



## Support for National Data Centres

The PTS continued to assist in the installation of the ‘NDC in a box’ software. This software and associated documentation enable NDCs to interactively review waveform data and include additional software and documentation for receiving data in continuous data (CD-1.0 and CD-1.1) formats and for calculating waveform data availability. As of the end of 2004, the software had been distributed to 68 States Signatories. A limited amount of hardware was donated to NDCs by the PTS as old computers were being decommissioned.

In September, an updated version of a document addressing frequently asked questions about NDCs was made available to States Signatories (see “Dissemination of Information” in Major Programme 7). This is intended to facilitate the understanding of NDCs’ roles as stipulated in the Treaty and highlights the benefits and assistance available from the PTS.

NDCs were invited to the O&M workshop to share their views regarding IDC training activities and how these activities meet NDCs’ needs.

## PROCESSING AND ANALYSIS

### Waveform Data

Automatic data analysis and interactive review continued under near operational conditions. Standard IDC products were issued for each day. On average, 152 and 65 events per day were compiled within the automatic Standard Event List 1 and the REB respectively up to 25 December, compared with 144 and 68 in 2003. The recording of some two thousand aftershocks of the Sumatra earthquake of 26 December tested the automatic and interactive IDC processing under stress.

Testing and evaluation of software upgrades, and the identification of deficiencies and potential enhancements continued. The IDC Division continued to support the build-up of the IMS and the certification of IMS stations by configuring and testing new IMS stations and integrating them into the IDC operational system.

### Radionuclide Data

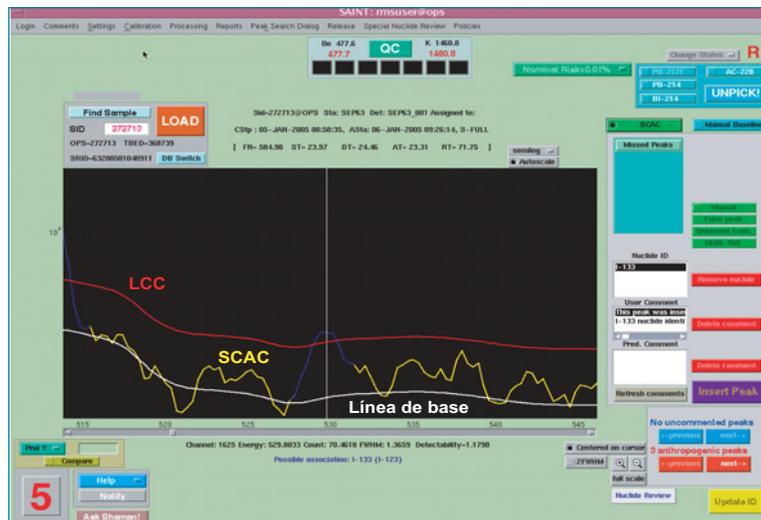
The emphasis in both particulate and noble gas data analyses continued to be on the design, improvement and testing of software and procedures, in addition to providing standard products of data processing. The number of radionuclide particulate monitoring stations in IDC operations increased by 8 during 2004, bringing the total to 32 stations.

These stations contributed over 12 000 gamma spectra per month, of which 1000 were full-sample spectra subject to interactive review and categorized



*IDC analyst processing waveform data.*

*Display produced with the Simulation Assisted Nuclide Review Tool, SAINT. The curve SCAC (single channel analyser curve) is the radionuclide spectrum smoothed with a resolution-dependent width. If the critical level, indicated by the  $L_c$  curve (LCC), is crossed, this indicates detection at a given risk level.*



according to nuclides detected. The distribution of spectra among the five categorization levels comprised 80.1%, 8.4%, 4.3%, 6.9% and 0.2% at Levels 1 to 5 respectively. There were 20 Level 5 spectra due mainly to detection of sodium-24 and caesium-137 in concert with a range of other nuclides.

The PTS worked closely with the radionuclide expert group appointed by WGB to further test and develop innovative software designed for interactive review purposes, and to introduce improvements in sensitivity. An enhanced-sensitivity experiment began in November 2004 for expert review purposes, resulting in an increase in the reporting of anthropogenic radionuclides. Over the year, the incidence of Level 5 spectra was nearly seven times that reported in 2003, with the increase being due to the larger number of stations and to the increased sensitivity.

Atmospheric transport modelling (ATM) now provides daily products within the RRR through several processing steps that include the online import of data from the European Centre for Medium-Range Weather Forecasts, calculations of standardized source–receptor sensitivity fields and processing of these into ‘fields of regard’.

Data for INGE continued to be collected from four gamma spectroscopic (SPALAX) systems in Canada, France (Tahiti) and Germany, and from two beta–gamma coincidence systems in China (ARSA) and Norway (SAUNA). These test operations have allowed the regular detection of CTBT-relevant xenon isotopes, particularly at the stations in Canada and Germany, and continue to provide essential experience for the development of analytical and screening procedures.

## Data Fusion, Review and Services

At the end of 2004, 85 secure signatory accounts (one for each requesting State Signatory) had been established, and a total of 668 users from these

States Signatories had been authorized to access IMS data and IDC products and receive technical support from the IDC. About 700 requests from authorized users regarding technical information were received and resolved during 2004.

The IDC performance reports, redesigned to be consistent with the requirements of the draft IDC Operational Manual in 2003, were further developed to provide additional metrics and to serve as a basis for IDC reporting during SPT1.

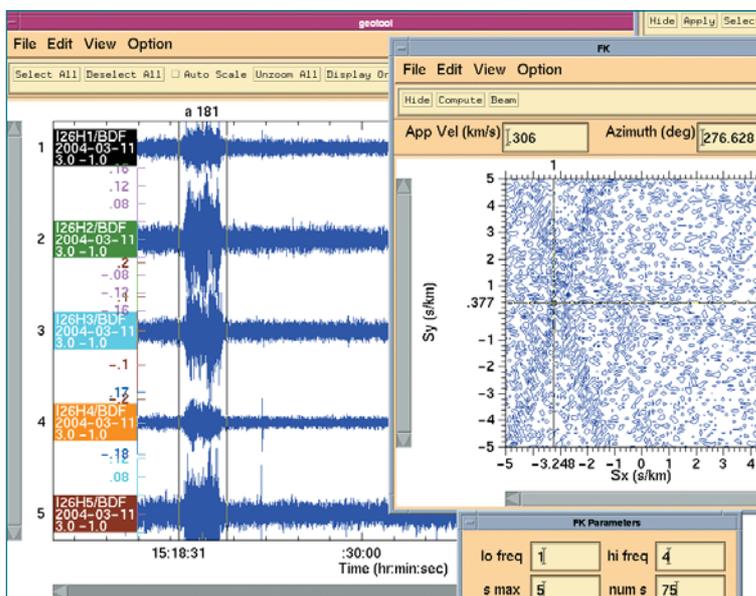
Quality assurance work continued with the assessment of the relative accuracy of the REB through comparisons with the Bulletin of the International Seismological Centre for 2001 and the Preliminary Determination of Epicenters (PDE) bulletin of the US National Earthquake Information Center (NEIC) for 2002. These investigations highlight the significant contribution of the REB to the monitoring of global seismicity. Similar work was completed in the evaluation of phase I of SPT1 in the form of comparisons with a global bulletin (NEIC PDE Weekly Listings) as well as with national bulletins.

The evaluation of the baseline performance of seismoacoustic event screening was conducted in the framework of SPT1 and identified means to increase the number of events which are screened out. In preparation for phase II of SPT1, work was initiated to improve the threshold monitoring software. In addition, a systematic review of the detection lists was started to assess the need for station-specific tuning of the data processing.

The IMS infrasound network detects on a regular basis various infrasound sources, among them meteor impacts, volcanic eruptions and supersonic aircraft, including space shuttle re-entries and rocket launches. One infrasound source in southern Germany, originating from well



Copyright DLR



Typical signals recorded from a propulsion test of the main engine of the Ariane 5 rocket (shown above) at Lampoldshausen near Heilbronn, Germany. Signal parameters correspond to the ground truth data obtained from such tests. Infrasound signals are only detected in winter months, highlighting the significant changes in atmospheric conditions between summer and winter.

controlled propulsion tests of the main engine of the Ariane 5 rocket and repeatedly recorded at infrasound station IS26 (Freyung), was identified as a potential benchmark to validate infrasound propagation models.

Radionuclide review focused on phase I of SPT1. Metrics were developed for performance assessment and the IDC products were compared with the reports of the Finnish NDC. Xenon isotopic activity ratios continued to be studied. The characteristics of various sources are now understood and the possibility to use the activity ratios was tested with preliminary data from INGE. In addition, methods for analysis of data from on-site inspections (OSIs) were explored.

## SOFTWARE DEVELOPMENT

### Waveform Development

In the infrasound area, the Progressive Multi-Channel Correlation (PMCC) method integrated into the detection subsystem was installed in IDC operations after introduction of upgrades. Development was concluded for infrasonic phase identification with the goal of identifying signals of relevance for the CTBT and separating them from detections which can be considered as ‘noise’ (surf noise, microbaroms, etc.). The initial version was installed on the IDC test bed. Development of a prototype of an interactive tool for infrasound data analysis continued and initial testing by analysts was started.

A PMCC-like algorithm is also being tested for the hydroacoustic triplet data processing. The updated seasonal and azimuth-dependent travel time tables created on the basis of long range modelling are being validated.

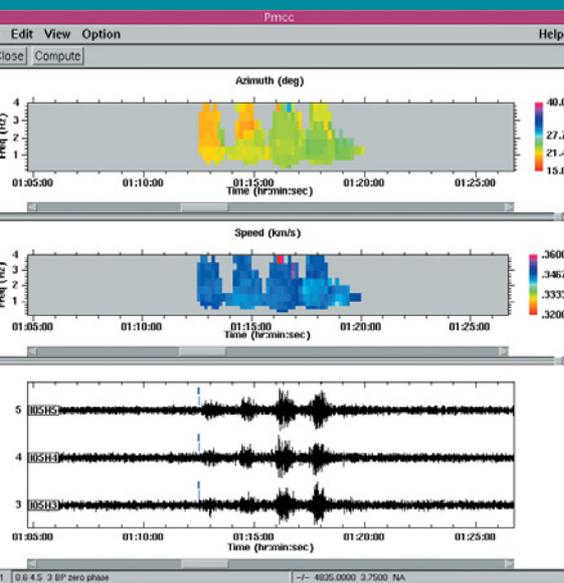
In the seismic area, the performance of the automated system was investigated with the goal of improving its functionality and the reliability of the Standard Event Lists. Improvements were made to the magnitude computation and azimuth determination.

The calibration effort continued with a focus on Africa and with operational testing of regional travel time corrections for northern Eurasia.

In the event screening area, the modifications requested by the expert group on event screening were implemented. Work has been proceeding for one contract. The second contract has not yet been concluded owing to pending legal issues in the negotiation stage.

### Radionuclide Development

The particulate analysis software was enhanced to provide the analysts with decision making support, together with numerous practical features



*Example of an infrasound signal processed by the new prototype IDC software.*

based on analysts' experience over the years. The review software provides for extraction of weak signals from background noise and for subsequent radionuclide identification. Initial tests indicate a reduction of interactive review times by a factor of between 5 and 10, with simultaneous improvement in the sensitivity and objectivity required for accurate and repeatable analyses.

In the area of noble gas monitoring, the PTS has developed a plan whereby different analysis methods and algorithms are to be developed and coded. The first contract for software coding was let during 2004, for automatic analysis of data from beta-gamma coincidence systems. The routine test monitoring which is being conducted has provided new information on the very low but detectable xenon-133 background levels at high latitudes.

The ATM work continued with perfecting and tuning of the software. A final step providing an end user facility for customized processing, including fusion with other technologies, has been envisaged and formulated in a project for which a development contract has now been awarded. Cooperation with the World Meteorological Organization (WMO) continued, including the preparations for a second experiment in January 2005 involving WMO support in cases of significant radionuclide detections.

### **Software Integration**

Software integration work continued in the areas of software development, maintenance and configuration management. The framework for sustainable software development was elaborated in the areas of database interaction and application logging. Parts of the framework are being used in new software development projects throughout the PTS.

Software to receive data in CD-1.0 and CD-1.1 formats was further developed. Related projects provide the capability to forward waveform data to States Signatories and to store the data in a database. Associated documentation has been written and is being maintained. New software for calculating the mission capability of waveform stations was developed. This software is currently being upgraded to be consistent with the definitions specified in the new revisions of the draft IMS Operational Manuals.

Several upgrade patches of the IDC applications software were put into operation in the IDC. These upgrades not only addressed deficiencies but also included a number of enhancements. A long term project to enhance the interactive software used by waveform analysts was completed. A number of changes were made to improve the database performance of the IDC software.

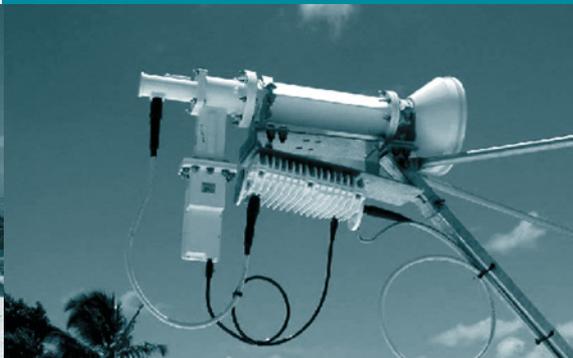
## COMPUTER INFRASTRUCTURE

The Computer Infrastructure Section of the IDC Division provided services to support the work and activities of the PTS and States Signatories, as described below. Technical support continued to be provided to all users in the PTS, to maintain and operate the desktop systems, printers and other peripheral equipment. The email system, for which a high availability requirement is apparent, has been migrated to a new hardware and operating system platform.

The computer infrastructure supporting the IDC applications software was upgraded to use the latest operating system release for Sun computers, Solaris 9. The various network components were operated, maintained and, where necessary, replaced. The key/certificate management system supporting the authentication requirements of the verification regime is operational, and is providing certificates for certified stations in IDC operations.

The preparations for the relocation of the computer centre to a more secure, purpose built environment in the Vienna International Centre (VIC) have led to the procurement of all major necessary materials and services.

Projects in 2004 included the upgrade of the Document Management System (see also "Support for Meetings" in Major Programme 7) and the migration of all Web based services to a new operating system platform. Advice and support were provided on planning and implementing new information systems, including the IMS DOTS module and the IRS. The software licence management system and the user data management system became operational in 2004.



## Major Programme 3: Communications

## Major Programme 3: Communications



*AS27, Søndre Strømfjord, Greenland, Denmark.*

The main task of Major Programme 3 is to ensure the transport of data from the IMS facilities to the IDC, and to provide access to IMS data and IDC products to States Signatories, using the Global Communications Infrastructure (GCI).

### **GCI MANAGEMENT**

The year 2004 will be remembered as the year for proving the viability of the GCI in transporting IMS data to the IDC in both CD (continuous data) and AutoDRM (Automatic Data Request Manager) formats, and for supporting station operator command and control using a mixture of very small aperture satellite terminal (VSAT), terrestrial line and virtual private network (VPN) technologies. This lent confidence to the preparation of technical specifications for the next generation of the GCI, which was started in 2004. Despite occasional problems caused by growing network usage, CD stations transmitted well over the GCI. The performance was confirmed during phase I of SPT1. Major enhancements to the GCI network management system (NMS), the firewall and VPN infrastructure improved the control and oversight of network usage. To support the growing network, initiatives to improve coordination both within the PTS and between the PTS and the GCI contractor and station operators were taken, with positive results.

### **PROCUREMENT OF THE NEXT GENERATION OF THE GCI**

The current contract for the GCI will expire in 2008. To ensure continuity of GCI services, the PTS worked with a group of experts of States Signatories, established by WGB, to define future GCI performance requirements and technology options. Following the submission of the report and recommendations of the expert group at the Twenty-Third Session of WGB, the PTS prepared terms of reference and other documents to invite suppliers to provide an expression of interest. The invitations were formally released in December 2004, with a deadline of 1 March 2005 for replies. The responses from suppliers will be reviewed in order to refine the terms of reference and generate a shortlist of vendors to be invited to bid for the continuation of GCI services.

## GCI IMPLEMENTATION

### VSAT Installations

GCI coverage continued to expand throughout 2004, with 29 new VSATs installed. As of 31 December, 30 GCI site surveys had been completed. Seventeen radio frequency licences, including several which had been outstanding for a long time, were obtained. Of the total planned number of 248 VSATs, GCI site surveys had been completed for 234 (94.3%); 187 (75.4%) VSATs had been installed at IMS, NDC and development sites; and 186 (75.9%) licences had been obtained in 63 of 91 countries (69.2%). Four VSATs had to be turned off because they did not have a licence.

New connections to the polar regions were achieved using customized configurations for each location. Infrasound station IS27 (Georg von Neumayer, Antarctica) was connected using a hybrid of both satellite and VPN technologies. Connectivity was also established in a similar manner to primary seismic stations PS5 (Mawson) and PS50 (Vanda) and to auxiliary seismic stations AS35 (SANAE Station) and AS114 (South Pole) in Antarctica. With these five additional sites a total of seven sites are now connected in the polar regions.

### VPN Connections and System Upgrade

VPN services were upgraded in 2004 to increase the capability of static connections from 20 to more than 100 connections, to provide enhanced back-up and reliability, and to add remote access using a dynamic VPN solution integrated with the existing PTS one time password infrastructure.

VPN servers were added to support secure connection to the GCI network over the Internet after VPN technologies were accepted as a viable solution. This was done to allow CD transfer and email on an exceptional basis, as was recommended by the Twenty-First Session of WGB in September 2003. VPN connections are now functioning as regular links in the GCI network to connect IMS stations for which no other medium is currently available, or to enable station operators and NDCs to connect to the GCI without using a VSAT. VPN technologies have been fully integrated into the PTS network management and performance measurement system. In 2004, a combined NDC and primary seismic station site was temporarily connected by VPN while waiting for a licence for the permanent VSAT installation. The performance characteristics of these connections have been shown, in many cases, to exceed the GCI criteria used to benchmark the performance of VSAT connections. By the end of 2004, 12 dedicated VPN circuits were installed and operating, an increase of 2 during the year. Fifty-three non-dedicated remote access VPN accounts were issued to station operators, network managers and PTS staff for the first time in 2004.



*RN68/HA9/IS49, Tristan da Cunha, United Kingdom.*



*N126, Niamey, Niger.*



AS47, Shushtar, Iran (Islamic Republic of).

### Network Management System

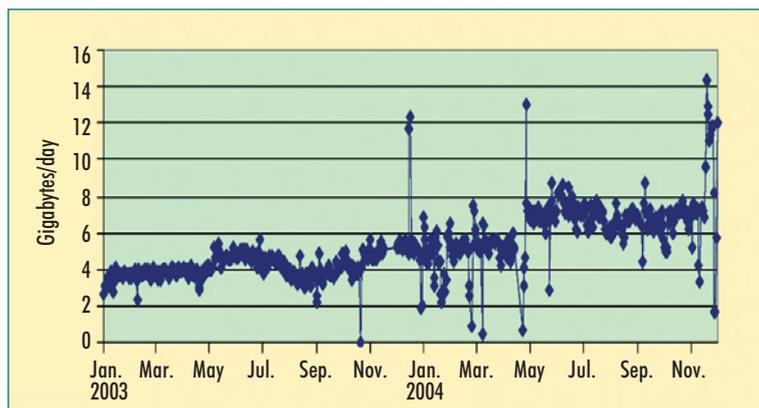
The NMS was upgraded in hardware and software in time to be used during SPT1. The upgrade has significantly improved the monitoring capabilities of the NMS. It provides a Web portal called the Unified Reporting Interface, from which PTS staff, network operators and NDC operators can check the status of their GCI link. Users can observe whether a link is up or down, read the start and end times of an outage, and generate reports on past response times and carried traffic. The Unified Reporting Interface is available to users connected by both GCI VSAT and Internet VPN. Training in the use of the interface was given to station operators and NDC managers at the O&M workshop in Baden in October, when the use of the Web portal was announced for the first time. This system is one of the most advanced satellite communications management systems ever built.

### Security and Networking

A new firewall was installed as part of the security upgrade recommended in the security audit performed in 2003, and is now operating to control access between GCI remote sites and the IDC, and among groups of GCI remote sites. Work is continuing to complete the firewall configuration. It will now be possible to selectively grant access by station operators to their respective stations. These improvements were funded as planned by making savings in GCI contract costs, which were achieved through discussions with the GCI contractor in 2003.

### Email over the GCI

The GCI mail servers supporting auxiliary seismic and radionuclide stations and radionuclide laboratories were upgraded in the last quarter to improve the flow of outgoing and incoming emails over the GCI. This removed transmission difficulties experienced by auxiliary seismic stations that send large data volumes. About 22 000 messages with over 1 gigabyte of content traverse the GCI each day.



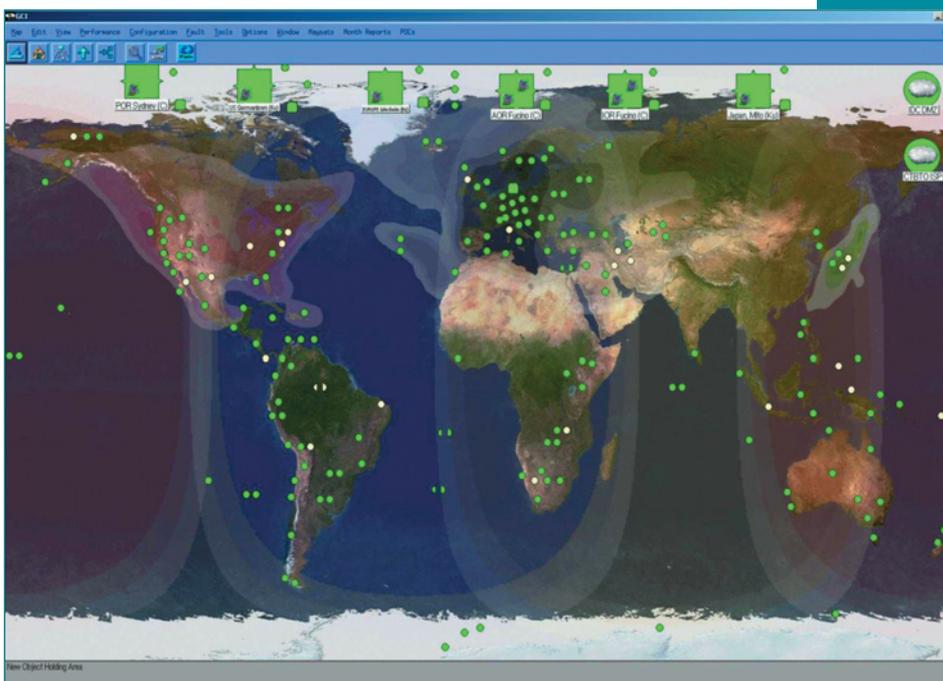
Increase in volume of IMS station data transmitted over the GCI during 2003–2004.

## OPERATION AND MAINTENANCE

At the end of 2004, 177 GCI links managed by the PTS were operating and passing traffic in 73 countries around the world, as well as the Antarctic region. In addition, more than 40 links in nine independent subnetworks contributed to the network coverage. Traffic passing over the GCI increased by 45% in 2004 to nearly 8 gigabytes per day. In the whole year, the equivalent of 3000 CD-ROMs passed over the GCI.

Communications between the PTS and station operators were rationalized with shared email formats, common points of contact and a system-wide common naming terminology. The PTS worked with the GCI contractor to adjust operating procedures to make them consistent with the local working hours of station operators and NDC managers. In 2004, efforts were made to combine trouble ticket recording systems into a single shared facility. These efforts should bear fruit in 2005. PTS staff and the GCI contractor handled 3829 GCI trouble tickets in the year. Subcontractors of Hughes Network Systems (HNS) made a total of 60 repair visits to 47 remote sites in 23 countries, an indication of the effort needed to keep the network running.

In April, Intelsat advised the GCI contractor that it had to move one of its satellites used by the GCI to cover the Pacific Ocean Region (POR) to a new orbit. As a consequence, all 29 VSATs installed in the POR were reprogrammed to a new satellite located at 180°. Five teams from the GCI contractor worked simultaneously to complete this transition in less than one month, visiting each of the sites in 12 countries. The project was completed smoothly by August with no loss of IMS data.



*The network management system shows the state of health of the GCI and is an essential tool for the O&M of the GCI. All GCI links to IMS facilities and NDCs are monitored in near real time. The colour green indicates a healthy link. Visual alarms and colour changes alert operators to potential anomalies.*

## MAJOR PROGRAMME 3: COMMUNICATIONS

The performance of the PTS Internet links was consistent during 2004, with an availability of greater than 99.9%. The two diverse links share normal Internet traffic as well as VPN traffic for the GCI. In June, one of the lines was upgraded to 4 megabits per second. The PTS issued a contract to upgrade the second line to the same speed in 2005. A service to monitor the usage and load sharing of the PTS Internet lines partly using the new NMS and partly using commercially available Internet monitoring services is in the advanced stages of negotiation with the GCI contractor. This will be of benefit to users of VPN links.



## 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 on-site inspection (OSI) regime at entry into force (EIF) of the Treaty. The major elements of OSI are inspectors, equipment and the OSI Operational Manual, together with supporting infrastructures.

### OSI STRATEGIC PLAN

In 2004, the PTS developed a strategic plan in order to establish the readiness of the OSI regime at EIF. The plan has two intermediate strategic goals and a final goal at the time of EIF. By achieving these goals in accordance with the time lines in the strategic plan, OSI readiness could be established by 2011.

The first intermediate goal is the large scale field exercise to be conducted in 2007 (FE07). The PTS began directing its efforts to plan, prepare and conduct FE07. In 2004, the PTS proposed the framework of FE07 to the States Signatories; this addresses the objectives and assumptions of the exercise as well as the procedures to be tested by FE07, the plan to conduct necessary training for the FE07 participants and the equipment procurement plan for FE07. In response to a note verbale concerning a host country for FE07, the PTS received proposals from three States Signatories and conducted site surveys to find a suitable site.

### OSI OPERATIONAL MANUAL, METHODOLOGY EXPERIMENTS, INFRASTRUCTURE AND TRAINING

The elaboration of the draft OSI Operational Manual, which is to be presented to the initial session of the Conference of the States Parties upon EIF of the Treaty, remains a major task of the Commission. The PTS continued in 2004 to give priority to the support of the drafting process. Working on the agreed basis of the initial draft rolling text (IDRT), WGB is approaching the end of its first reading of the main body of the IDRT. For the purpose of making a smooth transition to a new stage of elaboration of the draft manual, States Signatories have started to explore practical ways of accelerating the process, with a new emphasis on the preparation of a set of inspection procedures, based on the results of the



*Fourth tabletop exercise: control planning team.*

elaboration process, to be included in field guides for FE07. The first-hand experience thus gained will help in assessing and rationalizing both the process and the product of elaboration.

At the request of WGB, and in particular the Task Leader for the draft OSI Operational Manual, the PTS submitted its view on the range of manual elements suitable for testing, as well as the scope of subsidiary documents needed, in the framework of the strategic plan and the preparations for FE07.

OSI Workshop-10 was held from 18 to 22 October 2004 in Vienna. The workshop concentrated on the Operational Manual and FE07 testing procedures, inspection techniques for the initial and later periods of an OSI, and radionuclide equipment development issues. Direct results of the workshop include: a common understanding on the scope of all manual related testing material for FE07, to be developed by the current elaboration group under WGB, and a set of subsidiary documents to be developed by the PTS; a request that the acquisition of OSI equipment be pursued aggressively by the PTS and Policy Making Organs (PMOs) to meet the needs of OSI activities; and identification of the scope of future work for radionuclide equipment development projects.

As a step in the implementation of suggested actions obtained by analysing the OSI information stored in the Lessons Learned Database, the 2004 OSI directed exercise (DE04) was designed to address these actions. One of the important lessons from the 2002 large scale field experiment in Kazakhstan (FE02) was that the field analysis of extremely low magnitude aftershocks resulting from a small underground explosion imposes specific requirements on the seismic equipment, processing computers and analytical software. To address this issue, the PTS, with the assistance of experts and equipment from supporting States Signatories, prepared and conducted DE04 during two weeks in October, focusing mainly on the acquisition and processing of seismic data. Following an offer from the Slovak Government to host DE04, activities in the first week, devoted to data acquisition in the field of simulated nano-aftershocks, took place near Bratislava. While they still require further analysis, the preliminary conclusions from the field activities are that the passive seismic detection may require a seismic network that is two to three times denser than originally anticipated, and that in order to improve the detection capability, the introduction in the passive seismic network of tripartite mini-arrays should be seriously considered. In parallel a training session was organized by the PTS at the VIC, in which experts nominated by States Signatories utilized different seismic software in order to identify the features required for the best applicable seismic analytical software for OSI. During the second week of DE04, the issue of seismic data processing was addressed and some key features for such software were identified.

Regarding OSI health and safety, the PTS set up an expert panel with the purpose of enumerating OSI-specific health and safety standards. At the initial meeting of the panel (nine experts from six States Signatories



*2004 directed exercise, Slovakia: emplacement of a seismic station.*

## MAJOR PROGRAMME 4: ON-SITE INSPECTION



*Lecture during OSI introductory course.*

together with PTS representatives) in Vienna on 22–24 March 2004, discussions were conducted on health and safety areas for which OSI-specific standards are needed, existing standards were reviewed for possible adoption for OSI purposes, and three subgroups were formed to focus on different areas. In addition to intersessional work, three more meetings were held in Vienna in October, November and December to produce the first comprehensive drafts of OSI health and safety standards and to agree on a schedule to finalize the standards by mid-2005.

The annual OSI introductory course is already an established element of the training and exercise programme (TEP). The introductory course was endorsed by the 2003 OSI external evaluation team and by the participants of the 2004 OSI workshop as an important and well balanced outreach activity which also helps in preparing a roster of trained OSI inspectors. The eighth OSI Introductory Course was conducted in April 2004 in Vienna. Its aim was to familiarize experts from States Signatories with the OSI regime and its development. The course focused mainly on the OSI process and its context, the phenomenology of nuclear explosions, OSI technologies, and the rights and obligations of the inspection team (IT) and the inspected State Party (ISP). A total of 44 trainees from 33 States Signatories, representing all the geographical regions of the Treaty, participated in the course. The recommendations of the participants in these activities will contribute to improvement of the curriculum of the training programme as well as to the elaboration of the OSI Operational Manual.

The fourth tabletop exercise (TTE-4) was conducted from 22 to 26 November in Vienna. Like previous tabletop exercises, TTE-4 was a methodological exercise as well as a curriculum building activity. Thus its main objectives were to develop and test the curriculum for a tabletop exercise as an element of the TEP and to contribute to the elaboration of the OSI Operational Manual through lessons learned and a list of issues to be studied. The subject of TTE-4 was the transition from the initial to the continuation period of an inspection. This phase in the inspection has both technical and political aspects and needs special attention by the IT while it is still continuing its routine work of data collection, and is therefore an important subject in inspector training. TTE-4 was planned, designed and controlled with the help of an international control and planning team, which included four experts from four States Signatories. The exercise was based on a general scenario describing a hypothetical ISP and an IT during the conduct of an inspection on the 16th and 25th days. A total of 21 experts from 21 States Signatories participated in the event as the IT, while the control team participated as the ISP. In addition, there were two expert evaluators selected by the PTS and observers nominated by States Signatories.

From 26 July to 6 August 2004, a combined activity of equipment testing and curriculum development, which focused on equipment and techniques for the continuation period of an OSI, was conducted at the University of Leicester, United Kingdom. Eighteen technical experts from 16 States Signatories, 17 lecturers, including equipment suppliers, and 2 observers from States Signatories participated in the activity.



*OSI equipment demonstration, United Kingdom: assembly of a ground penetrating radar system prior to use in the field.*

The fifth OSI Experimental Advanced Course had the aim of developing a curriculum for the advanced course for the continuation period geophysical sub-team. Participants attended lectures pertaining to equipment utilization issues as well as nuclear explosion signatures and logistics of deployment of geophysical techniques during an inspection. During the course, participants concentrated on the actual deployment of the equipment in the field, data collection, data analysis and presentation of results. Special emphasis was given to the synergetic presentation of data gathered by the different geophysical techniques. The University of Leicester provided a unique and excellent site for testing the equipment and its deployment, and good administrative arrangements for the conduct of the overall activity. The equipment testing at Leicester was a follow-up of the demonstration in Italy in 2003. Selected equipment (for shallow measurements) was tested and recommendations on its applicability for OSI were considered. The activity was successful and achieved its objectives in both aspects.

## OSI 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. Partial quantities of the types of equipment, for testing and training purposes only, that are currently in the custody of the PTS are also indicated in the table. In 2004, efforts continued towards the acquisition and technical testing of additional categories of specialized core OSI equipment, especially unique items for measurement of levels of radioactivity and equipment for use in geophysical methods during the continuation period of an OSI. No additional items were included in the PTS custody or inventory in 2004, but nonetheless significant advances were made towards achieving the Commission's objectives.

The focus in 2004 was on advancing projects for development, technical testing and acquisition of the various categories of unique radionuclide tools. Measurement of the radioactive noble gases xenon and argon-37 is important for OSIs conducted under the Treaty. Equipment for undertaking such measurement is, however, unique and needs to be specially designed and developed. The PTS initiated two separate projects for developing and obtaining, initially for testing and training purposes, the related equipment.

Following a competitive procurement action undertaken by the PTS, the two selected suppliers have embarked on the development of the prototype equipment for xenon sampling, separation and measurement. Development is on schedule and equipment from both suppliers is currently expected to be available to the PTS during the second half of 2005 for use in further demonstration, testing and training.



*OSI equipment demonstration, United Kingdom: demonstration and testing of two alternative ground penetrating radar systems.*



*OSI equipment demonstration, United Kingdom: magnetic field mapping survey with a caesium vapour magnetometer.*

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

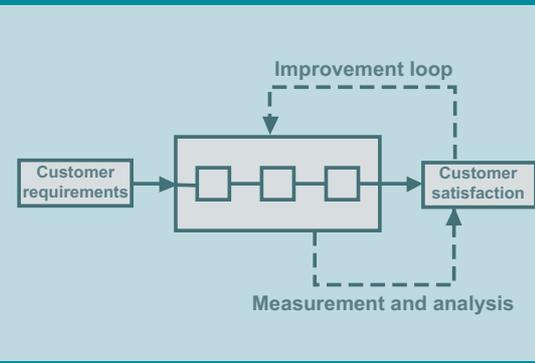
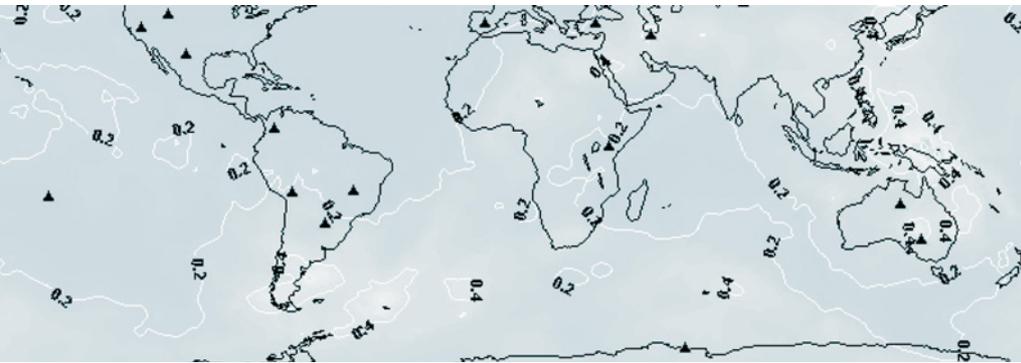
Activities and Techniques Specified in Part II of the Protocol to the Treaty	Equipment Approved (or to be Further Considered) by the Commission	Equipment Obtained by the PTS <sup>a</sup>	
		In PTS custody	In State Signatory custody
Position finding (para. 69(a))			
• From the air	Analogue altimeter	✓	
• 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)	✓	
	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: 37Ar, 95Zr, 95Nb, 99Mo, 103Ru, 115mCd, 131I, 132I, 132Te, 131mXe, 133mXe, 133gXe, 135Xe, 140Ba, 140La, 141Ce, 144Ce, 144Pr, 147Nd, 99Tc, 106Rh	High resolution gamma spectrometer tool for field and laboratory use – ‘blinded’ or measurement restricted		Project ongoing
	Equipment for xenon sampling, separation and measurement		Project ongoing
	Argon-37 equipment for sampling, separation and measurement – not yet considered		Project ongoing
	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		Project ongoing
	Gravitational field mapping equipment		Project ongoing
	Ground penetrating radar		Project ongoing
	Electrical conductivity measurement equipment		Project ongoing
Drilling (para. 69(h))	Not yet considered		
Communication equipment (para. 62)	Not yet considered		

<sup>a</sup> 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).

As tasked by the Commission, the PTS supported and attended in March 2004 the initial demonstration of a Movable Argon-37 Rapid Detection System (MARDS) developed independently by the Institute of Nuclear Physics and Chemistry, China Academy of Engineering Physics, Mianyang, China. The technical descriptions and results of this initial demonstration of a field-deployable argon-37 measurement system were made available to States Signatories in the form of two reports prepared by the PTS and were also considered by experts attending OSI Workshop-10 in October. It is expected that this project will be expanded in 2005 to include work with a laboratory located at the University of Berne, Switzerland; this is the only alternative facility in the world currently having the capability and experience of measuring argon-37 at low levels in the atmosphere. The aim of this work is to enable improvements to be achieved in the measurement characteristics of MARDS and in the laboratory based analysis of samples.

PTS staff also continued to undertake market surveys and keep abreast of current developments in the commercial radionuclide measurement equipment market for unique radionuclide survey and analysis tools, specifically with a view to obtaining a high resolution gamma spectrometer tool. On the basis of previous technical work undertaken by the PTS, a detailed technical requirements document to be issued to possible suppliers was prepared, initially for review by States Signatories, and the PTS expects to undertake follow-up actions for obtaining this unique measurement tool during 2005.

During 2004, the partial set of equipment for the passive Seismic After-shock Monitoring System (SAMS) initially obtained by the PTS some five years ago was maintained and serviced by the vendor Refraction Technology (RefTek). In early October this equipment was deployed during DE04 in Slovakia. The recommendations from the vendor and by experts of States Signatories regarding the obsolescence of certain components of SAMS are a concern. The need to address the upgrading of the components will become pressing, especially if equipment owned by the PTS is to be available for use in FE07. Alternatives to purchasing components for upgrading, such as contributions in kind, could be explored by the PTS prior to FE07, but this approach will have to rely on equipment rental or on the willingness of States Signatories to assist the PTS.



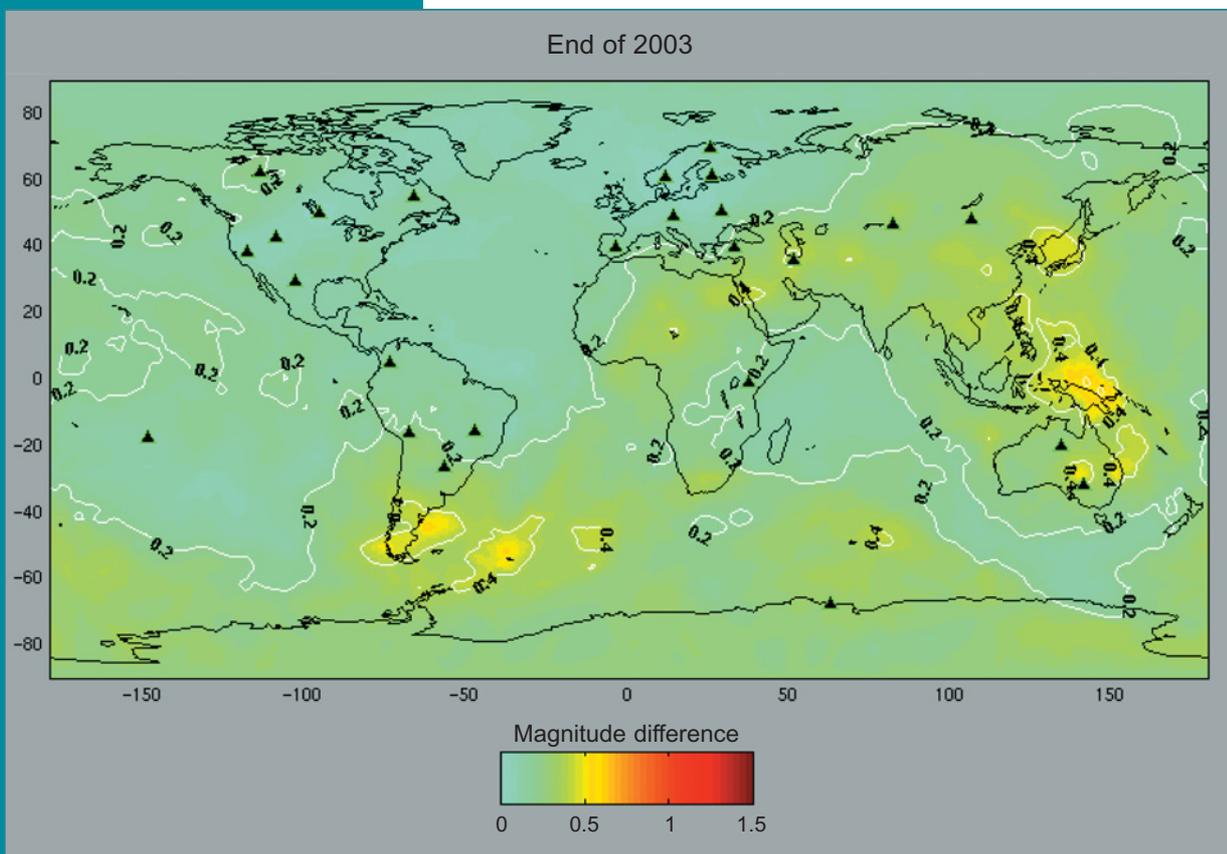
# Major Programme 5: Evaluation

## Major Programme 5: Evaluation

### *Validation of PTS modelling tools in SPT1*

*Tmtool is a software tool for modelling the detection capability of the primary seismic network of the IMS. The station configurations in Tmtool are being updated to correspond to the SPT1 station network. Within SPT1 and as a main objective of the NDC–evaluation workshop to be held in 2005, it is intended to validate the software by comparing the results of simulations with real observations.*

During 2004, WGB endorsed the objectives and orientation of the evaluation and quality assurance activities proposed by the PTS for 2005–2009. The goal of the Evaluation Major Programme in this period is twofold: firstly, to contribute to developing a performance planning and assessment system, encompassing system build-up activities and development of provisional verification readiness; and secondly, to revisit the quality system of the PTS with a view to addressing key requirements of standard ISO 2001 issued by the International Organization for Standardization, in particular those related to customer requirements, and to measuring, analysing and continually improving the performance of the system.



## EVALUATION

In 2005–2009, the PTS plans a shift from system build-up to provisional operation and testing. To ensure that the PTS achieves the system commissioning targets and provisional verification readiness objectives with the financial and human resources available, a performance planning and assessment system is needed to manage such a transition. In 2004, and in order to gain experience in performance planning, the PTS evaluation work focused on formulating assessment frameworks for the testing of activities, including SPT1 and OSI activities, with the aim of assessing the level of provisional verification readiness.

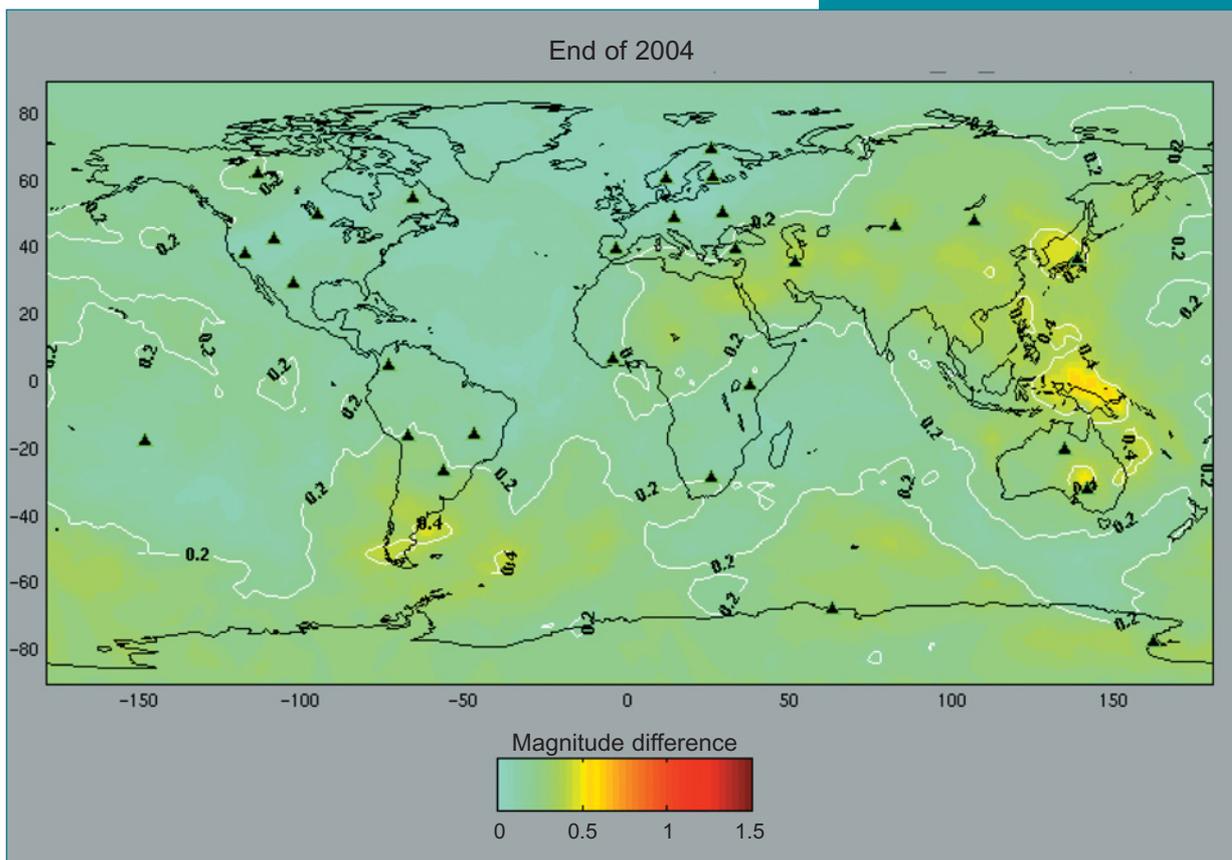
### Assessment of SPT1

The assessment of SPT1 during 2004 centred on three major issues: the ability of the PTS to collect and transmit data from the IMS, the ability to meet data processing and product delivery objectives, and the determination of the system baseline cost and cost–performance relationships. The aim was to assess the capacity of the functional elements currently in place, including the work processes supporting the achievement of performance targets, e.g. data availability and quality requirements, data processing and product and service delivery.

*The maps show simulations of the estimated automatic detection capability of certified IMS stations at the end of 2003 and 2004 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 (yellow) in the map for the end of 2004, with 29 certified stations, show a decrease in size relative to the end of 2003, when there were 25 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.*



## MAJOR PROGRAMME 5: EVALUATION

The preliminary results of the assessment appeared to indicate four priority aspects needing further work: (a) the tools in place for logging problems, attributing data outages and making statistical analysis of failure rates; (b) the tools for monitoring the operational status of the IMS, including state of health and management information and decision making support tools; (c) development of O&M cost estimates for the PTS, based on a breakdown of work processes, including support processes, that would allow cost–performance relationships to be established; and (d) developing and calibrating the tools to measure and display the technical performance and capabilities of the IMS.

An assessment of the ergonomics of the analyst software tools used by the IDC analysts for interactive data analysis was launched in 2004 and is expected to be completed in September 2005. This study should provide advice to the PTS on whether the current tools correspond to the state of the art, and on their viability once the IMS build-up is completed.

### **Assessment of PTS Products**

In 2004, work was begun to assess the quality of PTS products corresponding to the SPT1 preparatory phase through intercomparison exercises with the participation of NDCs.

One conclusion from the intercomparison of radionuclide and waveform products in 2004 was the need to include a sufficiently large number of data to reach representative conclusions. The analysis of results proved time consuming despite the small number of participating NDCs. Therefore in 2004 the PTS prepared the basic infrastructure to facilitate the involvement of NDCs in the evaluation of SPT1 and the analysis of data during the intercomparison exercises in 2005.

For the radionuclide intercomparison, the infrastructure consists of a Linux based database, known as Linssi, where the PTS will compile NDC and PTS data and results of automatic or interactive analysis. This database, together with data and results, will be delivered to NDCs participating in the SPT1 evaluation. This arrangement will allow the analysis of large amounts of data or results, provide maximum transparency and allow NDCs to decide the scope of SPT1 evaluation that they deem appropriate.

Regarding radionuclide products, release 3.16 of the Aatami evaluation software was provided to interested NDCs for beta testing within the context of SPT1. Further to a request by WGB at its Twenty-Third Session, the possibility of making this tool independent of specific computer hardware and commercial software environments was being studied.

As requested by the Twenty-Third Session of WGB, the software Bulcmp and Tmtool were being upgraded. The upgrades will be made available to interested NDCs for use during SPT1 in 2005 in the context of PTS product quality assessment.

### **Assessment of OSI Activities**

Assessment frameworks were utilized in the evaluation of the 2004 OSI activities DE04 and TTE-4. The evaluators of these activities have contributed to improving the frameworks, which were deemed as useful tools to provide guidance and systematize evaluations and to assist in putting the objectives of these activities into the perspective of FE07. The evaluation reports for both activities will be issued in 2005.

### **QUALITY ASSURANCE**

A plan to review the PTS quality management system (QMS) was drafted and the review was begun in 2004. The plan calls for a revised quality policy and manual, and for a plan to implement the revised QMS. A draft will be submitted during the quality management workshop to be held in April 2005 and will include the review of the PTS quality policy and manual by a drafting team representing the major activities of the PTS.

### **WORKSHOP AND UNEG**

The Evaluation Section supported the planning and implementation of the O&M workshop held in Baden in October 2004, in particular the system performance and training sessions. The recommendations of the workshop regarding the participation of NDCs in the evaluation of SPT1 and in the intercomparison of results have guided the activities of the PTS in the preparation of the 2005 activities. The NDC-evaluation workshop in 2005 will focus on SPT1 and will take place from 17 to 21 October in Rome.

The PTS continued to support the endeavours of the United Nations Evaluation Group (UNEG), participated in the UNEG working group on norms and standards and the task force on harmonization and United Nations reform, and hosted a meeting of the working group in Vienna in preparation for the meeting in 2005.



## Major Programme 6: Policy Making Organs

## Major Programme 6: Policy Making Organs

The Commission held two sessions in 2004. In accordance with the decision by the Twentieth Session of the Commission to extend the terms of office of the Chairperson and Vice-Chairpersons from six months to one year with effect from 1 January 2004, HE Ambassador Yukio Takasu, Permanent Representative of Japan, chaired the Commission for the year 2004.

The Commission agreed on the procedures, time line and mandate for a review of the organizational structure of the PTS, to be carried out in the second half of 2004 and first half of 2005, as well as on the composition of the review team. The Commission also adopted the conditions of service and procedure for the appointment of the next Executive Secretary of the Commission and, at its Twenty-Third Session, appointed HE Ambassador Tibor Tóth (Hungary) as the next Executive Secretary for a four year term beginning on 1 August 2005.

The Commission's subsidiary bodies, Working Group A (WGA), Working Group B (WGB) and the Advisory Group, each held two sessions in 2004. To facilitate the timely consideration of matters related to the Programme and Budget, the Twenty-Third Session of WGB and the Twenty-Second Session of the Advisory Group were each divided into two parts with an interval of several weeks.

WGA, which was chaired by Ambassador Tóth, made recommendations, subsequently adopted by the Commission, on administrative and budgetary matters, including human resources issues and amendments to Financial Regulations and Rules to implement the split currency appropriation and assessment system in the Commission.

WGB, chaired by Mr Ola Dahlman (Sweden), made recommendations, subsequently adopted by the Commission, on a range of verification related issues. Special attention was devoted to OSI related issues, including the report of the external evaluation and a strategic plan for the development of the OSI Major Programme, and to the preparatory phase of SPT1.

The Advisory Group, chaired by Mr André Gué (France), considered and provided advice on financial, budgetary and administrative issues.



## **Major Programme 7: Administration, Coordination and Support**

## Major Programme 7: Administration, Coordination and Support

### SUPPORT FOR MEETINGS

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, as well as to informal consultations on facilitating the EIF of the CTBT and to training courses and workshops of the Commission held in Vienna.

All official documents of the Commission and its subsidiary bodies issued in 2004 (totalling approximately 5700 original pages) were processed and stored on the automated Document Management System (DMS). By the end of 2004, over 5000 documents, including all documents relating to all previous sessions of the Commission in all of the official languages, had been archived on the DMS.

During the reporting period, the 2003 Annual Report was made available in the six official languages of the Commission, both in booklet form and on the public web site. Programme and Budget related documents, including the Medium Term Plan: 2005–2009, as well as technical and workshop reports and new editions of the Permanent Missions booklet and Electronic Document Archive CD-ROM, were also issued. Reflecting the growing trend to disseminate information in electronic format, the international cooperation workshop series was redesigned in the form of slim booklets enclosing workshop presentations on CD-ROM. A meetings support package, consisting of a banner, participants' badges and nameplates, folders, posters and display signs, was created for the O&M workshop held in Baden, Austria, in October 2004. The package was based on templates which can be used to create a uniform set of supporting materials for future workshops that is in keeping with the corporate identity.

The PTS assisted States Signatories in accrediting their Permanent Representatives to the Commission. In 2004, 30 new Permanent Representatives were accredited, bringing the total number of accreditations to 110, compared with 107 at the end of 2003.

Discussions continued between the Government of Austria and the VIC based international organizations (VBOs) about additional conference facilities at the VIC, which would be used to accommodate conferences at the VIC during the asbestos removal project in 2008–2010 (see “General Services” below) and would serve afterwards as additional conference space for



*Support staff at meetings.*

the VBOs. On 18 October 2004, a memorandum of understanding between the Government of Austria and the VBOs was signed, setting a ceiling of €52.5 million for the project, of which the VBOs would jointly contribute €2.5 million. At its Twenty-Third Session, the Commission authorized the PTS to finalize the arrangements for the new conference facilities with the Austrian Government and to proceed with the project.

## IMPLEMENTATION OF 2004 BUDGET

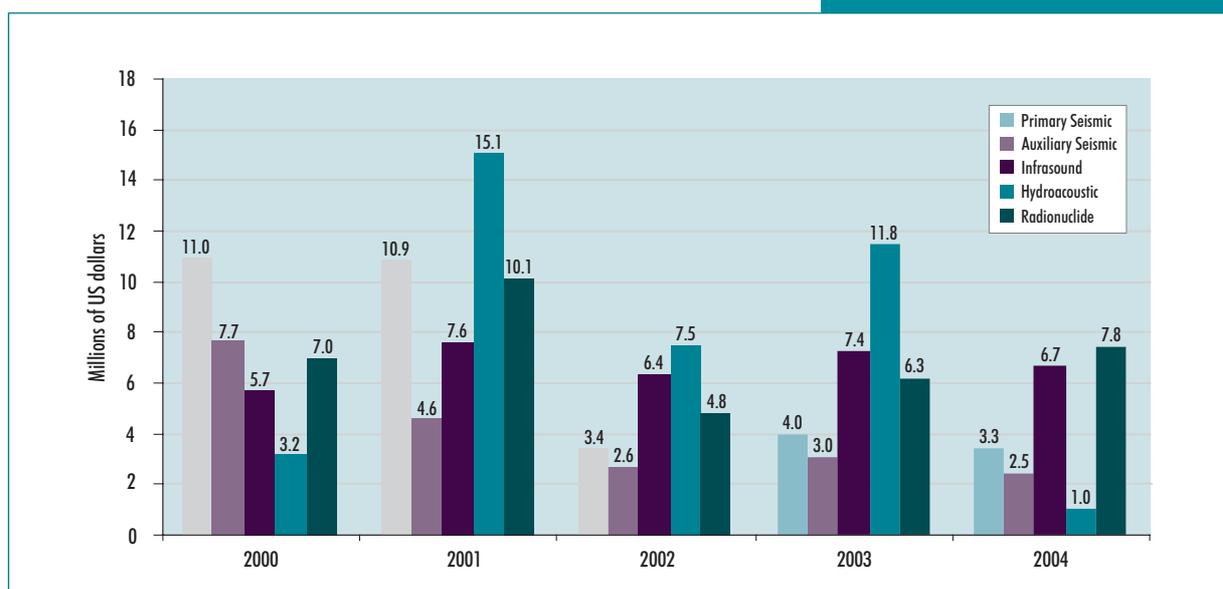
The Programme and Budget for 2004, at an exchange rate of 0.93167 euro to 1 US dollar, amounted to US\$94 548 700, which represented 6.7% nominal growth over 2003 but, in fact, a level of funding below zero real growth. Of the total budget, 81% was allocated to verification related activities, including an allocation of \$27 129 800 to the Capital Investment Fund (CIF), established for the build-up of the IMS. A breakdown of the 2004 Programme and Budget by Major Programme is shown in Table 4.

By 31 December 2004, 81 States Signatories had made full payments and 17 had made partial payments of assessed contributions for 2004, amounting to 92.19% of the total 2004 assessed contributions.

The expenditures for the Programme and Budget in 2004 amounted to \$83.7 million, of which \$21.2 million was from the CIF. For the General Fund, the unused budget amounted to \$4.9 million, or 7.2% of the total amount approved for the year. For the CIF, approximately 55.4% of the allotment was executed by the end of 2004. More detailed information on budget implementation can be found in the 2004 Programme and Budget Performance Report .

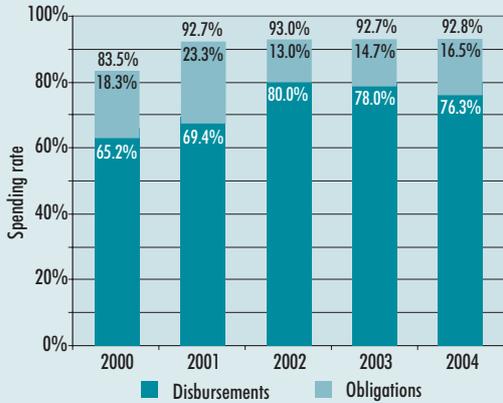
**Table 4. 2004 Programme and Budget  
by Major Programme**

Major Programme	\$(millions)
MP1: International Monitoring System	44.8
MP2: International Data Centre	16.1
MP3: Communications	10.8
MP4: On-Site Inspection	3.3
MP5: Evaluation	1.1
MP6: Policy Making Organs	2.8
MP7: Administration, Coordination and Support	15.6
<b>Total</b>	<b>94.5</b>

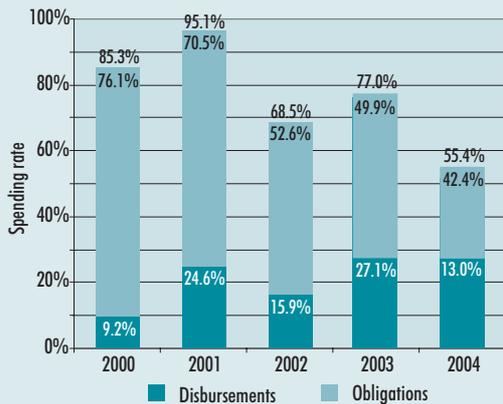


*CIF expenditure by IMS technology  
(2000–2004).*

## MAJOR PROGRAMME 7: ADMINISTRATION, COORDINATION AND SUPPORT



Annual General Fund budget implementation (2000–2004).



Annual CIF budget implementation (2000–2004).

In 2004, disbursements in the amount of \$245 799 and obligations in the amount of \$385 548 in indirect taxes were recorded by the PTS. The total cumulative amount of indirect taxes disbursed as of 31 December 2004 was \$1 078 770.

### PROCUREMENT

The PTS completed more than 360 procurement processes in 2004, compared with 315 in 2003. The total number of contracts for testing and evaluation and post-certification activities (PCAs) concluded by the end of the year was 36, covering 81 IMS stations, including 3 stations at which noble gas equipment was tested, and 4 radionuclide laboratories. Also, the PTS conducted negotiations on various stages of work for a further 55 IMS stations and an additional radionuclide laboratory.

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 this Rule had been invoked. In 2004, 21 sole source procurements falling into this category were concluded (compared with 23 contracts in 2003), with a total value of approximately \$9.2 million.

### INTERNAL AUDIT

During the year, the PTS prepared final audit reports on IMS PCA contracts, Programme and Budget implementation in the OSI Division, the Financial Obligations Management System (FOMS) and unliquidated obligations, staff training at Webster University and rental subsidy payments.

### GENERAL SERVICES

The long negotiations with the Austrian authorities culminated in a successful bidding procedure for the work to be carried out to remove asbestos from the VIC. The work started in late November 2004 with the move of the occupants of the 15th floor of building E to specially built temporary offices. PTS staff were expected to start moving from their offices in the first quarter of 2005.

At its Twenty-Third Session in November 2004, the Commission approved the PTS contribution to the payment of the costs of \$8 400 000 for Phase I of the VIC security enhancements. The PTS chaired the newly formed Security Advisory Group (SAG) and will continue to do so in 2005.

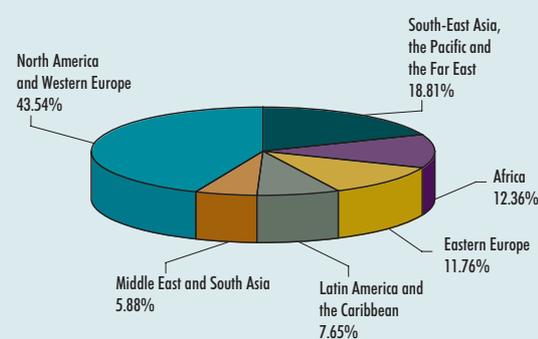
## HUMAN RESOURCES MANAGEMENT

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

As of 31 December 2004, the PTS had 267 staff members from 72 countries, compared with 272 staff members at the end of 2003. Figure 1 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. More detailed information on human resources issues is included in the 2004 Human Resources Management Report .

The PTS continued its efforts to increase the representation of women in the Professional category, which stood at 25.88% at the end of 2004, compared with 27.68% at the end of 2003. In comparison with 2003, the number of female staff members at the P2 and P3 levels decreased by 25.0% and 26.31% respectively, while at both the P5 and the P4 level there was an increase of 16.67%. The recruitment efforts continued against the background of low numbers of female applicants for the majority of vacancies for scientific posts. Discussions were held with some States Signatories regarding the modalities of encouraging female candidates to apply for vacant positions in the PTS.

In 2004, the PTS appointed 29 regular staff members. In addition, the PTS processed contracts for 50 consultants, 7 interns and 6 linguists; 103 contracts were processed for short term staff, including 42 for short term staff assigned to meetings.



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

**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	37	14	51
International Data Centre Division	74	27	101
On-Site Inspection Division	13	6	19
<b>Total, verification related</b>	<b>128 (75.29%)</b>	<b>48 (49.48%)</b>	<b>176 (65.91%)</b>
Office of the Executive Secretary	3	3	6
Internal Audit	2	1	3
Division of Administration	23	38	61
Legal and External Relations Division	14	7	21
<b>Total, non-verification-related</b>	<b>42 (24.71%)</b>	<b>49 (50.52%)</b>	<b>91 (34.09%)</b>
<b>Total</b>	<b>170 (100%)</b>	<b>97 (100%)</b>	<b>267 (100%)</b>

## MAJOR PROGRAMME 7: ADMINISTRATION, COORDINATION AND SUPPORT

The PTS organized training courses in computer and information technology, office and project management, staff development and cross-cultural communication. During the year, 128 staff members participated in internal and external training. All managers attended a mandatory two day seminar on gender and diversity.

Pursuant to a report, issued in January 2002, by an external consultancy firm on its personnel and management practices, the PTS continued to devote considerable effort to addressing and finalizing the issues raised in the report. In 2004, the PTS introduced revised recruitment procedures and guidelines and a revised policy on recognition of the performance of staff members, and finalized the draft for an improved performance appraisal system.

With regard to the seven year service limit, on the basis of the Executive Secretary's decision in the context of the judgement of 4 February 2004 by the Administrative Tribunal of the International Labour Organization, the PTS incorporated a reference to the applicability of Administrative Directives in contract extensions that were granted to staff members concerned.

### **INTEGRATED MANAGEMENT INFORMATION SYSTEM**

In 2004, the PTS entered a collaborative agreement with the United Nations Office on Drugs and Crime to implement and maintain the financial and personnel modules of the Integrated Management Information System (IMIS), a software package developed by the United Nations for resource planning. Staff attended various training sessions for the preparation and implementation of IMIS. The personnel module was implemented in July 2004. The implementation of the new software required that several procedures and practices be revised in order to ensure a smooth transfer to the new system with minimal disruption to the work of the affected staff. From October to December, the PTS ran the new and old payroll production systems in parallel and populated IMIS with financial data to ensure a smooth conversion of the financial systems in January 2005.

### **INFORMATION SECURITY**

A revised Information Paper entitled Information and Confidentiality: PTS Policies and Procedures was produced for the consideration of WGB. WGB took note of the paper as the basis for the development and implementation by the PTS of a practical system for handling sensitive information in the period extending up to EIF, and agreed to review the implementation of the policies and procedures periodically. (See also "Information Security" in Major Programme 2.)

## REVIEW OF THE ORGANIZATIONAL STRUCTURE OF THE PTS

Pursuant to the decision adopted by the Commission at its Twenty-Second Session on a review of the organizational structure of the PTS, the external review team held the first of its three meetings in Vienna from 4 to 15 October 2004. A progress report was presented to the Twenty-Third Session of the Commission. The PTS provided secretarial and administrative support for the team.

## SIGNATURES AND RATIFICATIONS

In 2004, the Treaty was signed by four States (Rwanda, Saint Kitts and Nevis, the Sudan and the United Republic of Tanzania) and was ratified by twelve States (Bahrain, Belize, the Democratic Republic of the Congo, the Libyan Arab Jamahiriya, Liechtenstein, Rwanda, Serbia and Montenegro, Seychelles, the Sudan, Togo, Tunisia and the United Republic of Tanzania), including one of the States listed in Annex 2 to the Treaty (the Democratic Republic of the Congo), whose ratification is necessary for EIF. As of 31 December 2004, the Treaty had 174 signatures and 120 ratifications, including ratifications by 33 of the 44 Annex 2 States. The overall status of signatures and ratifications since the Treaty opened for signature on 24 September 1996 is shown in Table 6.

**Table 6. Signatures and Ratifications by Year**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Signatures	138	11	2	4	5	5	1	4	4	174
Ratifications	1	7	18	25	18	20	8	11	12	120

## RELATIONS WITH STATES AND INTERNATIONAL ORGANIZATIONS

The PTS continued efforts dedicated to broadening understanding of the Treaty and encouraging wider participation in the work of the Commission, in order to facilitate the establishment of the Treaty's verification regime and promote signature and ratification of the Treaty with the aim of achieving its early EIF and eventual universality. The PTS also further developed relations with relevant international organizations.

### Relations with States

With the emphasis on States hosting IMS facilities and States which have yet to sign and/or ratify the Treaty, in particular those listed in Annex 2 to the Treaty, the PTS maintained dialogue through bilateral visits in capitals and interaction with Permanent Missions in Vienna, Berlin, Geneva and New York. Contacts were also made in the framework of multilateral fora at the global, regional and subregional levels. In this context the Executive Secretary visited Argentina, Bolivia, Bosnia and Herzegovina, China, Croatia, the Democratic Republic of the Congo, Ecuador, Honduras, Indonesia, the Lao People's Democratic Republic, the Libyan Arab Jamahiriya, Madagascar, Mauritius, Mozambique, Oman, Slovenia, Sri Lanka, Thailand, Tunisia, the United Arab Emirates and Viet Nam.

## MAJOR PROGRAMME 7: ADMINISTRATION, COORDINATION AND SUPPORT

In Vienna, the Executive Secretary also met with a number of senior government officials, including the Minister for Foreign Affairs of Kazakhstan, the Minister of Environment and Nature of Mongolia, the Minister for External Affairs, International Trade and Civil Aviation of Saint Lucia and President of the fifty-eighth United Nations General Assembly, and the Deputy Foreign Minister of Poland.

Three new IMS facility agreements were concluded in 2004 (with Israel, Kazakhstan and Oman), bringing the total number of concluded agreements or arrangements to 31. Of these, 24 have entered into force and 1 is being applied provisionally pending its EIF. (The IMS host States with which the Commission has concluded facility agreements or arrangements are listed at the end of this report.)

The facility agreement between the Commission and Spain was supplemented in 2004 by means of an agreement in the form of an exchange of letters concerning the provisional O&M of primary seismic station PS40 (Sonseca). An exchange of letters was also concluded between the Commission and the United States of America concerning communication links for the GCI. A further three interim exchanges of letters were completed in 2004 (with Egypt, the Libyan Arab Jamahiriya and the United Republic of Tanzania) concerning IMS facilities, pending the conclusion of formal facility agreements or arrangements. Appropriate legal arrangements are now in place for 324 facilities in 82 countries.

In 2004, two exchanges of letters were completed regarding the terms of use of voluntary contributions received from the Czech Republic and the Netherlands (see also “Voluntary Contributions” below).

As of 31 December 2004, 103 States had notified the Commission of their designation of National Authorities, or ‘national focal points’, in accordance with Article III, paragraph 4, of the Treaty.

The PTS concluded 11 agreements or arrangements for technical meetings hosted in 10 countries (Azerbaijan, Finland, Indonesia, the Russian Federation, Senegal, Slovakia, South Africa, Tunisia, the United Kingdom and Venezuela (Bolivarian Republic of)).

### **Relations with International Organizations**

The PTS continued to develop contacts and cooperation with relevant global and regional international organizations. The Executive Secretary addressed the fifty-ninth session of the United Nations General Assembly and the forty-eighth session of the General Conference of the International Atomic Energy Agency. He also discussed, in Jakarta, with the Secretary General of the Association of South-East Asian Nations (ASEAN) further cooperation between the Commission and ASEAN.

The PTS participated in the meetings of the High Level Committee on Programmes and the High Level Committee on Management of the United Nations system as well as their subsidiary coordination bodies related to fields of activity of international organizations of interest to the PTS (i.e. security, information technology and human resources).

PTS staff participated in the Ministerial Meeting of the Association of Caribbean States (ACS) in Panama, the Third Ordinary Session of the Heads of State and Government of the African Union in Addis Ababa, the Ninth 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 14th Ministerial Conference of the Non-Aligned Movement in Durban, the Third 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 thirty-fourth Regular Session of the General Assembly of the Organization of American States (OAS) in Quito and the thirty-fifth Pacific Islands Forum Summit in Apia, and addressed the fifty-ninth session of the First Committee of the United Nations General Assembly. The PTS also made a presentation on the work of the Commission to the members of the Committee on Hemispheric Security of the OAS.

The Twenty-Third Session of the Commission approved an agreement providing for cooperation between the Commission and the ACS. (The international organizations with which the Commission has concluded relationship and cooperation agreements are listed at the end of this report.) At the same session, the Commission also approved the text of an Agreement on the Transfer of Pension Rights of Participants in the United Nations Joint Staff Pension Fund and of Participants in the Provident Fund of the Preparatory Commission.

### **Training, Workshops and Other Capacity Building Activities**

The PTS continued to assist in promoting cooperation among States Signatories to facilitate exchanges related to technologies used in the verification of the Treaty, as well as to support the timely establishment of the verification regime and early EIF of the Treaty. In this context, further emphasis was placed on training, including coordination within the PTS, on reaching out through various means to States in order for them to engage more actively in the work of the Commission, and on providing assistance to such States, as necessary.

Further work on the coordination of PTS training activities included the development of a database and the exploration of a training evaluation system to be developed in parallel with a training handbook.

In cooperation with the Government of Tunisia, the PTS organized a Workshop on CTBTO International Cooperation for States from Northern

## MAJOR PROGRAMME 7: ADMINISTRATION, COORDINATION AND SUPPORT

Africa, which was held in Tunis from 13 to 15 April 2004. Thirty-five participants from six States attended the workshop. The workshop contributed to further useful exchanges among States of the region and resulted in some useful proposals for promoting CTBT work in the region.

With the strong support of the Government of South Africa, the PTS organized a Workshop on CTBTO International Cooperation for States from Southern Africa, which was held in Pretoria from 29 November to 1 December 2004 in cooperation with the South African Council for Geoscience. Twenty-nine participants from 12 States attended the workshop. In addition, a participant from Finland contributed to the event as a speaker from outside the region.

The PTS supported the Government of Azerbaijan in organizing an expert follow-up meeting on the establishment of a regional cooperation centre on CTBT work for States from central Asia and the Caucasus. The meeting, which was held in Baku from 13 to 14 December 2004, provided a useful opportunity for technical experts from the region to engage in a preliminary discussion on the possible establishment and operation of the proposed regional cooperation centre. It was acknowledged that further regional exchanges on the proposal were needed.

The PTS supported two national seminars on the CTBT organized by Suriname, in Paramaribo, from 30 to 31 March 2004 and by Indonesia, in Jakarta, from 6 to 7 December 2004. The objectives of each seminar were twofold: to inform representatives of relevant authorities of the respective Government about detailed procedures for implementation of legal obligations by States Signatories and potential benefits which could be derived; and to assist the respective Government in preparing an action plan for Treaty ratification and implementation at the national level. In each seminar some 60 participants, representing ministries, Parliament and other relevant authorities, contributed to the discussions and prepared an action plan for national implementation of the CTBT.

The PTS provided workstations and PCs loaded with operating software and software related to NDCs, together with peripherals, to three States in Africa, one State in the South-East Asia, the Pacific and the Far East region, one State in Latin America and the Caribbean, and one State in Eastern Europe. Close interaction with several other States requesting Commission support for the establishment and operation of their NDCs continued.

### Voluntary Contributions

Using voluntary contribution funds provided by the Government of Norway in 2003, in support of international cooperation activities for the timely establishment of the verification regime as well as the early EIF of the Treaty, the PTS organized an information visit programme. Senior experts and Government officials from Eritrea, the Sudan and the United Republic of Tanzania participated in the programme. In 2004, the Czech Republic



*Participants of national seminar on the CTBT in Paramaribo, Suriname, March 2004.*



*Participants of national seminar on the CTBT in Jakarta, Indonesia, December 2004.*

and the Netherlands provided voluntary contribution funds amounting to \$18 000 and €100 000 respectively in support of the international cooperation and outreach activities of the Commission.

The PTS also cooperated with the Japanese authorities regarding the training programme on global seismological observation organized by Japan for developing States. The training was conducted in Tokyo from October to December 2004.

The annual hands-on training course in radionuclide technology for experts from developing countries offered by the Government of Finland was held on 15–17 March 2004 in support of NDC establishment and operation. Six participants from six States (Brazil, Indonesia, the Libyan Arab Jamahiriya, the Philippines, Uganda and Viet Nam) attended.

## CIVIL AND SCIENTIFIC APPLICATIONS OF VERIFICATION TECHNOLOGIES

Speakers from the PTS contributed to an experts' discussion on civil and scientific applications of CTBT verification technologies, which was held in Berlin on 10 and 11 May 2004. The event, organized by the Governments of Germany and Japan, was attended by experts from Austria, Canada, China, France, Germany, Indonesia, Japan, Switzerland, the United Kingdom and Viet Nam.

## DISSEMINATION OF INFORMATION

In 2004, the PTS received numerous press enquiries, particularly in the aftermath of two events. The first event was reported by the press to have taken place in the Democratic People's Republic of Korea on 9 September. As a result, about seventy news outlets referred to the CTBTO. The second event was the earthquake and subsequent tsunami in South-East Asia, which occurred on 26 December. In that case, about fifty news outlets referred to the CTBTO. The PTS conducted some thirty interviews with the print and electronic media following these events.

Twenty-five press releases were issued in 2004 on various topics, including the latest Treaty ratifications and developments in the establishment of the IMS. The PTS held two press conferences and participated in a joint briefing organized by the United Nations Information Service for the press and non-governmental organizations (NGOs). The PTS arranged for a team of eight journalists from both international and Austrian media to cover the OSI directed exercise held in Slovakia in early October (see also "OSI Operational Manual, Methodology Experiments, Infrastructure and Training" in Major Programme 4).

PTS public information activities in 2004 focused on the Africa and the Latin America and the Caribbean geographical regions. In this regard,



CTBTO Spectrum.

## MAJOR PROGRAMME 7: ADMINISTRATION, COORDINATION AND SUPPORT



Home page of the Commission's public web site.

two issues of *CTBTO Spectrum* were published following the Twenty-Second and Twenty-Third Sessions of the Commission. Each issue was placed on the public web site and distributed in hard copy to 1800 recipients, while 160 subscribers used the automatic Web based subscription facility. In total, over 17 000 copies of public information material were distributed to States Signatories, NGOs, academia and the media.

The PTS designed and printed a booklet entitled *Frequently Asked Questions About National Data Centres*. It also produced a brochure entitled *South-East Asia, the Pacific and the Far East and the CTBT*. Six issues of *CTBTO News* were printed and distributed to all Permanent Missions in Vienna.

An essay competition for students in tertiary level educational institutions was launched in April and was brought to the attention of about eighty universities around the world. The winner was announced in September 2004.

The public web site was updated frequently throughout the year and new electronic versions of information materials in official languages other than English were made available. The PTS continued to apply the corporate identity to new and existing products such as IMS facility maps and the Treaty booklets in Arabic, Chinese, English and French.

### LIAISON WITH NGOs

The PTS maintained its close contacts with the NGO community to further promote the CTBT and the work of the Commission. The Executive Secretary hosted breakfast meetings with NGO representatives in Vienna, Geneva and New York to brief them on activities of the Commission.



## Supplementary Information

## States Whose Ratification is Required for the Treaty to Enter into Force (31 December 2004)

41 ■ Signed    33 ■ Ratified    3 ■ Not signed

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



## Status of Signature and Ratification by States Listed in Annex 1 to the Treaty (31 December 2004)

174 ■ Signed    120 ■ Ratified    20 ■ Not signed

State	Date of Signature	Date of Ratification
■ Afghanistan	24 Sep. 2003	24 Sep. 2003
■ Albania	27 Sep. 1996	23 Apr. 2003
■ Algeria	15 Oct. 1996	11 Jul. 2003
■ Andorra	24 Sep. 1996	
■ 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	12 Apr. 2004
■ Bangladesh	24 Oct. 1996	8 Mar. 2000
■ Barbados		
■ Belarus	24 Sep. 1996	13 Sep. 2000
■ Belgium	24 Sep. 1996	29 Jun. 1999
■ Belize	14 Nov. 2001	26 Mar. 2004
■ Benin	27 Sep. 1996	6 Mar. 2001
■ Bhutan		
■ Bolivia	24 Sep. 1996	4 Oct. 1999
■ Bosnia and Herzegovina	24 Sep. 1996	
■ 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	11 Mar. 2003
■ Croatia	24 Sep. 1996	2 Mar. 2001

State	Date of Signature	Date of Ratification
Cuba		
Cyprus	24 Sep. 1996	18 Jul. 2003
Czech Republic	12 Nov. 1996	11 Sep. 1997
Democratic People's Republic of Korea		
Democratic Republic of the Congo	4 Oct. 1996	28 Sep. 2004
Denmark	24 Sep. 1996	21 Dec. 1998
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	
Eritrea	11 Nov. 2003	11 Nov. 2003
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	9 Apr. 2003	
Georgia	24 Sep. 1996	27 Sep. 2002
Germany	24 Sep. 1996	20 Aug. 1998
Ghana	3 Oct. 1996	
Greece	24 Sep. 1996	21 Apr. 1999
Grenada	10 Oct. 1996	19 Aug. 1998
Guatemala	20 Sep. 1999	
Guinea	3 Oct. 1996	
Guinea-Bissau	11 Apr. 1997	
Guyana	7 Sep. 2000	7 Mar. 2001
Haiti	24 Sep. 1996	
Holy See	24 Sep. 1996	18 Jul. 2001
Honduras	25 Sep. 1996	30 Oct. 2003
Hungary	25 Sep. 1996	13 Jul. 1999
Iceland	24 Sep. 1996	26 Jun. 2000
India		
Indonesia	24 Sep. 1996	
Iran (Islamic Republic of)	24 Sep. 1996	
Iraq		
Ireland	24 Sep. 1996	15 Jul. 1999
Israel	25 Sep. 1996	
Italy	24 Sep. 1996	1 Feb. 1999
Jamaica	11 Nov. 1996	13 Nov. 2001
Japan	24 Sep. 1996	8 Jul. 1997
Jordan	26 Sep. 1996	25 Aug. 1998
Kazakhstan	30 Sep. 1996	14 May 2002
Kenya	14 Nov. 1996	30 Nov. 2000
Kiribati	7 Sep. 2000	7 Sep. 2000
Kuwait	24 Sep. 1996	6 May 2003
Kyrgyzstan	8 Oct. 1996	2 Oct. 2003
Lao People's Democratic Republic	30 Jul. 1997	5 Oct. 2000
Latvia	24 Sep. 1996	20 Nov. 2001
Lebanon		
Lesotho	30 Sep. 1996	14 Sep. 1999
Liberia	1 Oct. 1996	

SUPPLEMENTARY  
INFORMATION

State	Date of Signature	Date of Ratification
 Libyan Arab Jamahiriya	13 Nov. 2001	6 Jan. 2004
 Liechtenstein	27 Sep. 1996	21 Sep. 2004
 Lithuania	7 Oct. 1996	7 Feb. 2000
 Luxembourg	24 Sep. 1996	26 May 1999
 Madagascar	9 Oct. 1996	
 Malawi	9 Oct. 1996	
 Malaysia	23 Jul. 1998	
 Maldives	1 Oct. 1997	7 Sep. 2000
 Mali	18 Feb. 1997	4 Aug. 1999
 Malta	24 Sep. 1996	23 Jul. 2001
 Marshall Islands	24 Sep. 1996	
 Mauritania	24 Sep. 1996	30 Apr. 2003
 Mauritius		
 Mexico	24 Sep. 1996	5 Oct. 1999
 Micronesia (Federated States of)	24 Sep. 1996	25 Jul. 1997
 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	
 Netherlands	24 Sep. 1996	23 Mar. 1999
 New Zealand	27 Sep. 1996	19 Mar. 1999
 Nicaragua	24 Sep. 1996	5 Dec. 2000
 Niger	3 Oct. 1996	9 Sep. 2002
 Nigeria	8 Sep. 2000	27 Sep. 2001
 Niue		
 Norway	24 Sep. 1996	15 Jul. 1999
 Oman	23 Sep. 1999	13 Jun. 2003
 Pakistan		
 Palau	12 Aug. 2003	
 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	30 Nov. 2004	30 Nov. 2004
 Saint Kitts and Nevis	23 Mar. 2004	
 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

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

Facilities of the CTBT International  
Monitoring System

State	Primary Seismic Stations	Auxiliary Seismic Stations	Radionuclide Stations	Radionuclide Laboratories	Hydroacoustic Stations	Infrasound Stations	Total
Argentina	1	2	3	1		2	9
Armenia		1					1
Australia	4	3	7	1	1	5	21
Austria				1			1
Bangladesh		1					1
Bolivia	1	1				1	3
Botswana		1					1
Brazil	1	2	2	1		1	7
Cameroon			1				1
Canada	3	6	4	1	1	1	16
Cape Verde						1	1
Central African Republic	1					1	2
Chile		2	2		1	2	7
China	2	4	3	1		2	12
Colombia	1						1
Cook Islands		1	1				2
Costa Rica		1					1
Côte d'Ivoire	1					1	2
Czech Republic		1					1
Denmark		1				1	2
Djibouti		1				1	2
Ecuador			1			1	2
Egypt	1	1					2
Ethiopia		1	1				2
Fiji		1	1				2
Finland	1			1			2
France	1	2	6	1	2	5	17
Gabon		1					1
Germany	1		1			2	4
Germany and South Africa <sup>a</sup>		1					1
Greece		1					1
Guatemala		1					1
Iceland		1	1				2
To be determined	1	1	1			1	4
Indonesia		6					6
Iran (Islamic Republic of)	1	2	1			1	5
Israel		2		1			3
Italy		1		1			2
Japan	1	5	2	1		1	10
Jordan		1					1
Kazakhstan	1	3				1	5
Kenya	1					1	2
Kiribati			1				1
Kuwait			1				1
Kyrgyzstan		1					1
Libyan Arab Jamahiriya			1				1

<sup>a</sup> Germany and South Africa are jointly responsible for an auxiliary seismic station in Antarctica.

State	Primary Seismic Stations	Auxiliary Seismic Stations	Radionuclide Stations	Radionuclide Laboratories	Hydroacoustic Stations	Infrasound Stations	Total
Madagascar		1				1	2
Malaysia			1				1
Mali		1					1
Mauritania			1				1
Mexico		3	1		1		5
Mongolia	1		1			1	3
Morocco		1					1
Namibia		1				1	2
Nepal		1					1
New Zealand		3	2	1		1	7
Niger	1		1				2
Norway	2	2	1			1	6
Oman		1					1
Pakistan	1					1	2
Palau						1	1
Panama			1				1
Papua New Guinea		2	1			1	4
Paraguay	1					1	2
Peru		2					2
Philippines		2	1				3
Portugal			1		1	1	3
Republic of Korea	1						1
Romania		1					1
Russian Federation	6	13	8	1		4	32
Samoa		1					1
Saudi Arabia	1	1					2
Senegal		1					1
Solomon Islands		1					1
South Africa	1	1	1	1		1	5
Spain	1						1
Sri Lanka		1					1
Sweden		1	1				2
Switzerland		1					1
Thailand	1		1				2
Tunisia	1					1	2
Turkey	1						1
Turkmenistan	1						1
Uganda		1					1
Ukraine	1						1
United Kingdom		1	4	1	2	4	12
United Republic of Tanzania			1				1
United States of America	5	12	11	1	2	8	39
Venezuela (Bolivarian Republic of)		2					2
Zambia		1					1
Zimbabwe		1					1
<b>Total</b>	<b>50</b>	<b>120</b>	<b>80</b>	<b>16</b>	<b>11</b>	<b>60</b>	<b>337</b>

## Facility Agreements or Arrangements with States Hosting IMS Facilities (31 December 2004)

State	Date(s) of Signature	Date(s) of Entry into Force
Argentina	9 December 1999	2 March 2004
Australia	13 March 2000	17 August 2000
Canada	19 October 1998	19 October 1998
Cook Islands	31 March 2000 14 April 2000	(Articles 6, 8 and 9 on 1 March 2000) 14 April 2000
Czech Republic	13 November 2002	29 January 2004
Finland	12 May 2000	6 June 2000
France	13 July 2001	1 May 2004
Guatemala <sup>a</sup>	26 November 2002	
Israel <sup>a</sup>	23 September 2004	
Jordan	11 November 1999	11 November 1999
Kazakhstan <sup>a</sup>	9 September 2004	
Kenya	14 October 1999 29 October 1999	29 October 1999
Mauritania	16 September 2003 17 September 2003	17 September 2003
Mongolia	5 June 2000	25 May 2001
New Zealand	13 November 1998	19 December 2000
Niger	20 November 2000 24 November 2000	24 November 2000
Norway	10 June 2002	10 June 2002
Oman <sup>a</sup>	19 May 2004	
Palau	16 April 2002 29 April 2002	29 April 2002
Panama	26 November 2003	26 November 2003
Paraguay <sup>a</sup>	4 April 2003	
Peru	14 March 2001	8 July 2002
Philippines	14 April 2003	8 January 2004
Romania	13 June 2003	13 October 2004
Senegal <sup>b</sup>	22 May 2001	
South Africa	20 May 1999	20 May 1999
Spain	14 September 2000	12 December 2003
Sri Lanka <sup>a</sup>	14 June 2000	
Ukraine	17 September 1999 27 September 1999	20 April 2001
United Kingdom	12 November 1999	16 June 2004
Zambia	18 September 2001 20 October 2001	20 October 2001

<sup>a</sup> Agreement or arrangement had not yet entered into force.

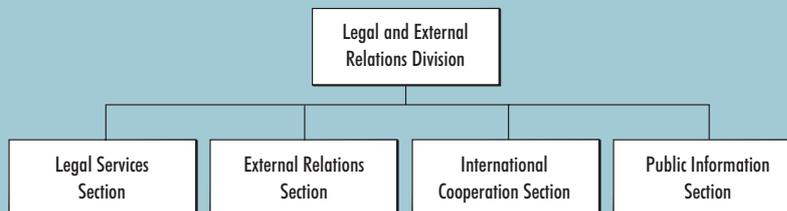
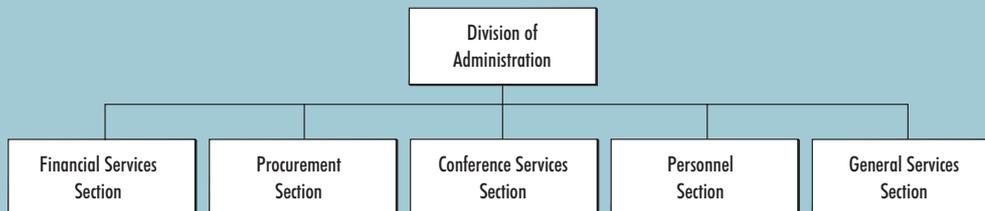
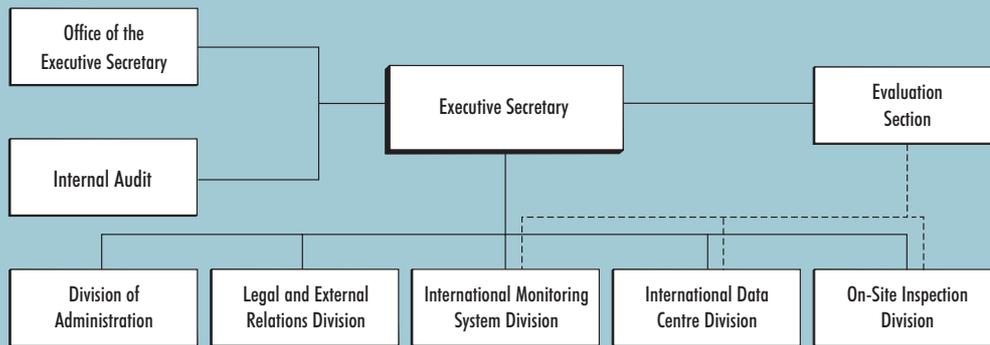
<sup>b</sup> Agreement has been applied provisionally since 22 May 2001.

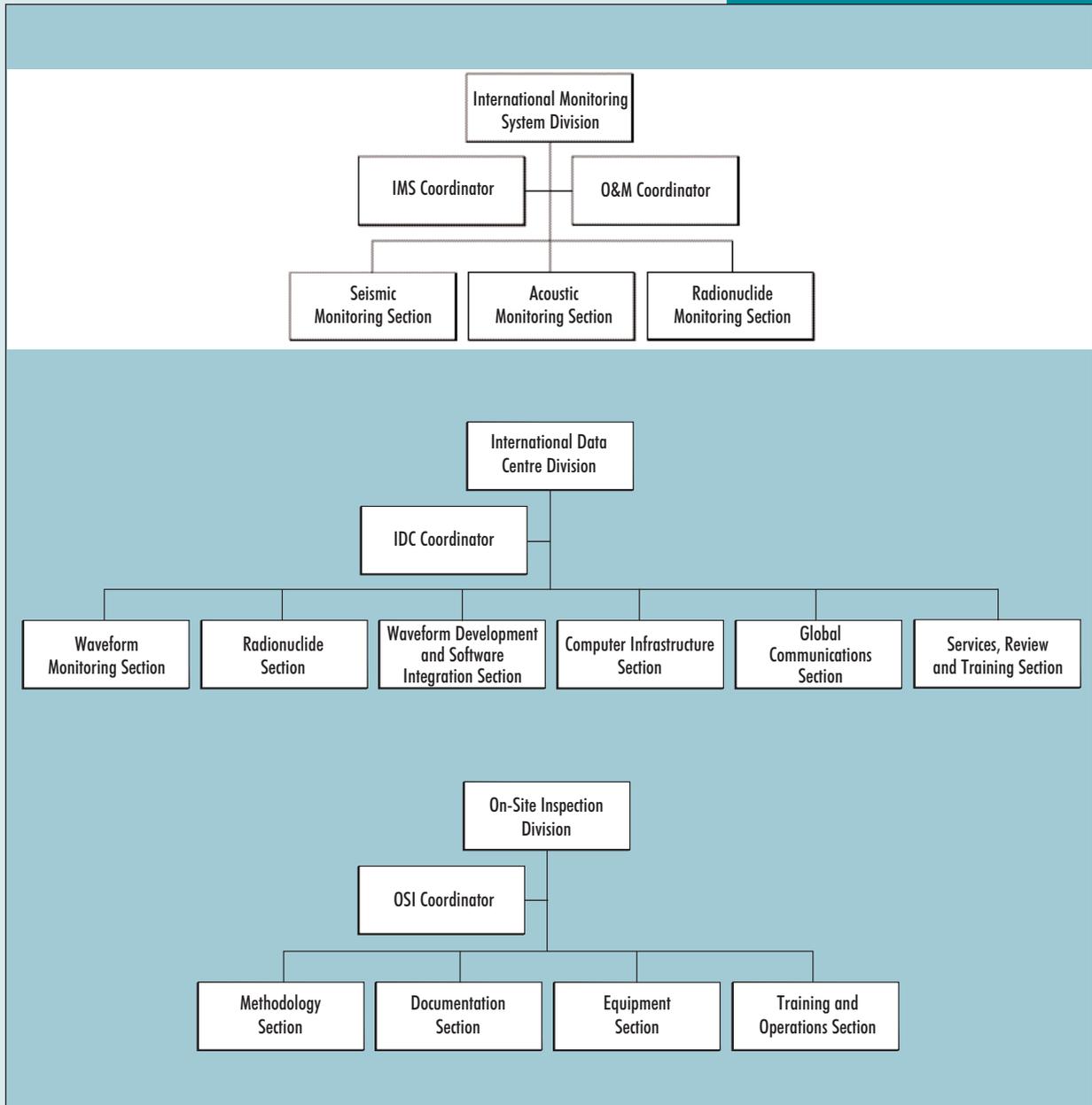
## Relationship and Cooperation Agreements with Other International Organizations (31 December 2004)

International Organization and Agreement	Date of Signature	Date of Entry into Force
<b>Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL)</b>		
Agreement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean	18 September 2002	18 September 2002
<b>European Centre for Medium-Range Weather Forecasts</b>		
Agreement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the European Centre for Medium-Range Weather Forecasts	a	24 June 2003
<b>United Nations</b>		
Agreement to Regulate the Relationship between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the United Nations	26 May 2000	15 June 2000
<b>United Nations Development Programme</b>		
Agreement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the United Nations Development Programme on the Provision of Support Services	7 December 2000	7 December 2000
<b>World Meteorological Organization</b>		
Agreement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the World Meteorological Organization	a	23 May 2003
-----		
<b>Association of Caribbean States</b>		
Agreement between the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization and the Association of Caribbean States	(Pending)	(Pending)

<sup>a</sup> A protocol recording the date of entry into force was signed after that date.

## Organizational Structure of the Provisional Technical Secretariat (31 December 2004)





## Abbreviations

ATM	atmospheric transport modelling
CD	continuous data
CIF	Capital Investment Fund
DE04	OSI directed exercise in 2004
DMS	Document Management System
DOTS	Database of the Technical Secretariat
EIF	entry into force
FE07	OSI major field exercise in 2007
GCI	Global Communications Infrastructure
IDC	International Data Centre
ILS	Integrated Logistics Support
IMS	International Monitoring System
INGE	International Noble Gas Experiment
IRS	IMS Reporting System
NDC	National Data Centre
NGO	non-governmental organization
NMS	network management system
O&M	operation and maintenance
OSI	on-site inspection
PTS	Provisional Technical Secretariat
REB	Reviewed Event Bulletin
RRR	Reviewed Radionuclide Report
SPT	system-wide performance test
TTE	tabletop exercise
VBO	VIC based international organization
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

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

All rights reserved

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

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

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

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

Printed in Austria  
June 2005

Based on document CTBT/PC-24/INF.8,  
Report of the Executive Secretary on Major Programmes 1–7 for 2004