

Verification highlights

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) includes a definition of a global verification regime to monitor compliance with the Treaty. Establishing this regime, which must be capable of detecting nuclear explosions underground, in water and in the atmosphere, is the main activity of the Preparatory Commission for the CTBTO. The verification regime must be operational at the Treaty's entry into force. The regime consists of an International Monitoring System (IMS) supported by an International Data Centre (IDC), consultation and clarification, on-site inspections (OSI) and confidence-building measures.

IMS station status

Considerable progress has been made in certifying and establishing IMS stations in the past six months. The number of certified facilities meeting all technical specifications has increased from 34 to 57, including two radionuclide laboratories. Site surveys have been completed for 284 stations out of the 337 IMS facilities. Altogether 150 stations have already been established or substantially meet specifications, and 80 additional stations are under construction or in contract negotiation. Some 80 facilities are currently sending data to the International Data Centre in Vienna, where the data are processed and released to Member States for final analysis.

IMS station installation: The Crozet Islands mission

The IMS network of seismic, hydroacoustic, infrasound and radionuclide

facilities covers the entire globe. Some IMS stations are located in very remote areas, and the installation and maintenance of these stations can pose unforeseeable engineering challenges.

Due to the efficient propagation of sound waves through water, the IMS hydroacoustic network consists only of eleven stations, six of which are hydrophone stations with sensors in the ocean. Between 5 March and 26 April 2003, three staff members from the CTBTO Provisional Technical Secretariat (PTS) participated in a mission to install hydroacoustic station HA04 on Crozet Islands in the Southern Indian Ocean.

The Crozet Archipelago has an isolated and inhospitable environment, notable for raging winds, cold and rain. The treeless islands are uninhabited except for a small French scientific base and millions of birds. Nearly 25 million come to breed here. With winds blowing at more than 100 km/h more than 120 days per year, the archipelago is one of the windiest places on earth.

The mission started its 2500 kilometre journey to the Crozet Islands on 8 March from Cape Town, South Africa, on board the cable ship René Descartes,



CAFETERIA OF THE RENÉ DESCARTES – NO FRENCH LUNCH TODAY, 11 APRIL 2003



ONE OF THE 25 MILLION 'CROZET ISLANDERS' WATCHING OUT FOR NEW ARRIVALS

which measures approximately 144 by 22 metres and has a complement of 80 people. Six days later, after crossing three time zones, the ship arrived at the Crozet Islands. One PTS staff member went ashore at the scientific base to check the shore facility and test the data as the hydrophones were deployed, and two PTS staff members remained on board to monitor operations and help in planning. A daily e-mail mission update was sent to the PTS Headquarters in Vienna.

After successfully deploying one out of six hydrophones on the first day, the underwater installation nearly came to a halt due to the adverse weather conditions. Gusty winds reaching 165 km/hour, ship rolls to 34 degrees to the side and sea swells up to eight metres made life on board a memorable experience. On 11 April, the mission reported that it was necessary to hold on to the furniture to avoid being thrown out of the chairs: "The cafeteria has been devastated by strong ship rolls. A table welded on the floor broke apart and

Data handling and processing at the IDC

Data collected by the International Monitoring System are transmitted in near-real time via the satellite-based Global Communications Infrastructure (GCI) to the International Data Centre (IDC) in Vienna for processing and analysis.

The IDC immediately transmits the data to Member States that have requested this service, via the GCI links. In 2002, around 300 gigabytes of continuous data were distributed by the IDC. The IDC processes the data automatically, using software specially designed and developed for Treaty verification purposes. Events such as earthquakes, mining blasts or volcanic eruptions that are detected and located automatically contribute to build event lists that are made available to Member States. Data received from radionuclide stations are also processed automatically to identify the radionuclides carried by the winds to the stations.

Even excellent software can not replace the work of experienced analysts in reviewing the automatic results as well as the raw data. The IDC analysts produce Reviewed Event Bulletins based on waveform data and Reviewed Radionuclide Reports based on radionuclide data. The IDC also assists Member States in identifying the nature of the events by computing parameters that may enable the Member States to characterize the events.

Although the IDC is still in the development and testing phase, IMS data and IDC products are currently distributed to more than 140 designated organizations in 65 Member States. These figures are constantly increasing as new Member States realize the importance of accessing such data and products. ■

Simulating on-site inspection tasks: The 2002 OSI field experiment

Preparing for an on-site inspection (OSI) which will clarify whether or not a nuclear test explosion has taken place is a major activity for the Preparatory Commission. An extensive field experiment was conducted in late 2002 to simulate and test initial phase OSI activities. Twenty-seven surrogate inspectors spent two weeks in a remote part of Kazakhstan testing OSI equipment and procedures.

The surrogate inspectors were chosen primarily for their technical expertise and field-based operational experience. Eighteen inspectors representing 17 different countries were selected from nominees from Member States, and nine came from the Provisional Technical Secretariat (PTS) staff. Three women participated, including two technical specialists.

Using an implicit, broad-area search strategy, complemented by their judgement about where a simulated violation of the CTBT might have occurred, nine seismic specialists collected and analysed data from about a dozen seismometers deployed throughout the inspection area.



SETTING UP A PASSIVE SEISMIC STATION IN A POTENTIALLY RADIOACTIVE ENVIRONMENT, OSI FIELD EXPERIMENT, KAZAKHSTAN, 17 SEPTEMBER - 15 OCTOBER 2002

In parallel, a group of four radionuclide specialists collected soil, water and gas samples to test handling and security procedures. Five visual specialists led other inspectors in searching the 550 km² inspection area, including by helicopter, for visual indicators of the simulated nuclear explosion, such as craters, displaced rocks, cabling and so on.



TAKING OFF FOR AERIAL OBSERVATION, OSI FIELD EXPERIMENT, KAZAKHSTAN, 17 SEPTEMBER - 15 OCTOBER 2002

A geographical information system was available to display the activities and help integrate the findings. Communications between subteams, the Base Camp and Vienna were provided by satellite phones. Two health and safety specialists created a radiation monitoring facility, and could render aid if any inspectors became ill or injured. Other inspection team members ensured the maintenance and distribution of all equipment, ran the field operations centre and prepared daily inspection plans and reports. All these activities were directed by the Inspection Team Leader without intervention by the experiment's PTS designers.

An independent evaluation has produced several hundred raw lessons which are still being distilled and analysed. Already, some have been included in the process for elaborating the OSI Operational Manual, and more will follow. ■

IMS station installation...

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squashed some chairs before being smashed on the bulkhead. It is pretty uncomfortable at the moment!"

In addition to the extreme weather conditions, the installation team had to deal with a series of technical problems such as damage to a cable caused by a ship's anchor prior to this mission. Altogether, the PTS staff spent 41 days on board the René Descartes, including many days due to weather delay, to complete

the installation. During this period over 30 kilometres of optical fibre cable were laid out, two hydrophone triplets were installed and the station communications tested until the station was successfully sending data to the International Data Centre in Vienna. On 20 April the PTS team left Crozet Islands for Cape Town, knowing that "if you can deal with the problems thrown up by working at sea, you can deal with almost anything". ■

All quotations are taken from the daily e-mail chronicle sent to PTS Headquarters.

Publications of the Provisional Technical Secretariat

The following publications are currently available in hard copy or can be downloaded electronically from the reference area of our web site at www.ctbto.org:



2002 ANNUAL REPORT
of the Preparatory Commission for the
Comprehensive Nuclear-Test-Ban Treaty Organization

AVAILABLE IN ARABIC, CHINESE, ENGLISH, FRENCH, RUSSIAN AND SPANISH.



BASIC FACTS: SIX BOOKLET SERIES
Booklet 1: The Comprehensive Nuclear-Test-Ban Treaty (CTBT) at a Glance

Booklet 2: The Preparatory Commission for the CTBT

Booklet 3: The Global Verification Regime and
the International Monitoring System

Booklet 4: The Global Communications Infrastructure and the International Data Centre

Booklet 5: On-Site Inspections Booklet 6: Membership Benefits

AVAILABLE IN ENGLISH, FRENCH AND SPANISH.



BROCHURE: OBJECTIVES AND ACTIVITIES
Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty

AVAILABLE IN ENGLISH, FRENCH AND SPANISH.

Calendar of Meetings 2003

Preparatory Commission:

20th Session 24 - 27 June 2003

21st Session 10 - 14 November 2003

Working Group A:

23rd Session 10 - 13 June 2003

24th Session 29 September - 3 Oct. 2003

Working Group B:

20th Session 17 Feb. - 7 March 2003

21st Session I 26 May - 6 June 2003

21st Session II 1 - 12 September 2003

Advisory Group:

20th Session I 22 - 25 April 2003

20th Session II 26 - 30 May 2003

21st Session 22 - 26 September 2003

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