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

The global network of stations which constitutes the International Monitoring System is unprecedented in the history of engineering. Stretching from the Arctic to Antarctica and from the Atlantic to the Pacific Ocean, it covers the entire earth. In 1997 work began on the 321 monitoring stations in 90 countries that make up the "listening posts" of the IMS (see Figure 1). Located in some cases in the most remote areas of the world, the stations use seismic, hydroacoustic, infrasound and radionuclide monitoring technologies.

CONSTRUCTION OF WIND-NOISE-REDUCING PIPE ARRAYS AT INFRASOUND STATION IS07 WARRAMUNGA (AUSTRALIA)

To date, site surveys for stations have been completed at 87 % of the sites. 137 stations (43%) are installed and substantially meet the Commission's specifications. PTS staff and numerous contractors around the world have worked in difficult environments to prepare the sites, construct the necessary infrastructure, purchase the equipment and install and test it.

Thirty-four IMS stations have so far undergone the formal process of certification. A certified station meets all the requirements necessary to become a recognized part of the IMS. This includes meeting all of the technical specifications established by the Commission, ensuring that data are tamper-proof and authenticated, and that data are sent in an uninterrupted stream to the International Data Centre in Vienna over an official Global Communications Infrastructure (GCI) link.

Following certification, the PTS begins to pay the station operation and maintenance costs, usually through a contract with the local technical institution that has assisted with the establishment of the station. ■

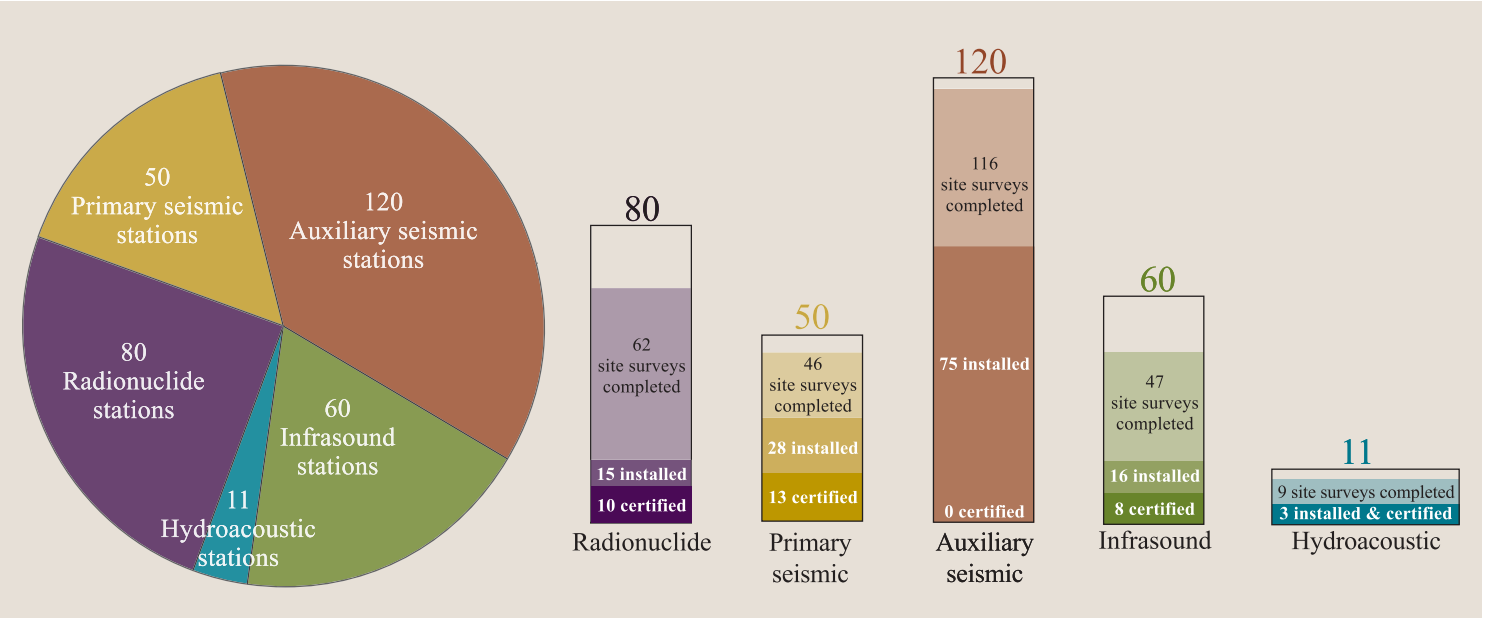

FIGURE 1. OVERVIEW OF IMS STATION STATUS AS OF 4 OCTOBER 2002

IDC and GCI activities

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

ANALYST AT THE INTERNATIONAL DATA CENTRE IN VIENNA

The GCI is the first global satellite communications network based on Very Small Aperture Terminal (VSAT) technology. IMS facilities and Member States in all but near-polar areas of the world can exchange data via their local VSAT earth stations through one of the five geosynchronous satellites. The satellites route the transmissions to VSAT hub stations on the ground, and the data is then sent to the IDC by terrestrial communications links. As of October 2002, the GCI installation programme had completed 125 VSAT installations out of the planned total of 234.

Between February 2000, when Member States approved the experimental distribution of data and products, until October 2002, over one million such items have been distributed to over 400 authorized users from 57 different Member States. Around 60,000 events such as earthquakes, mining blasts or volcanic eruptions, etc. worldwide have been detected and reported with minimal delay to Member States in the form of Reviewed Event Bulletins, the primary products derived from IMS data. By reviewing processed IMS radionuclide data, the IDC has detected and reported on nearly 200 CTBT-relevant radionuclides, or airborne radioactive particles. IMS data and IDC products continue to be successfully distributed to an ever increasing list of Member States. ■

On-Site Inspection activities and field experiments

On-site inspections are the final verification measure that can only be carried out once the Treaty has entered into force. An OSI clarifies whether a nuclear explosion has taken place in violation of the Treaty and gathers any facts which might assist in identifying any possible violator.

VISUAL OBSERVATIONS DURING THE ON-SITE INSPECTION FIELD EXPERIMENT IN KAZAKHSTAN, 17 SEPTEMBER–15 OCTOBER 2002

The major components of an OSI are an agreed Operational Manual, well-trained inspectors and approved equipment. On the request of any Member State and after approval by the Executive Council, an on-site inspection team of a maximum of 40 people must be on the territory of the Inspected State Party within six days and at the inspection site 36 hours thereafter. An on-site inspection may last up to 130 days and cover an inspection area of up to 1000 km2.

The Preparatory Commission has given high priority to the elaboration of the draft OSI Operational Manual. An initial draft rolling text of the Manual was completed in 2001 and the production of the draft Manual, which must be approved by the Conference of the States Parties at its initial session, is currently a major task of the Commission. Various training activities, workshops, equipment testing, tabletop and field experiments have taken place. To further elucidate the inspection procedures and technical and logistical aspects of an OSI, field experiments were held in Kazakhstan (1999) and in Slovakia (2001).

Between 17 September and 15 October 2002, an extensive field experiment took place in Kazakhstan to test the initial phase of an OSI. Twenty-seven surrogate inspectors with OSI equipment were flown into the country in order to find ‘evidence’ of a hypothetical nuclear event in an area covering 400 km2. The experiment will provide valuable data and insights for future OSIs. ■