



On-Site Inspection

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Introduction

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

The purpose of an OSI is to clarify whether a nuclear weapon test or any other nuclear explosion has been carried out in violation of the Treaty and to gather facts, as far as possible, which might assist in identifying any possible violator.

HIGHLIGHTS OF ACTIVITIES IN 2006

Under the guidance of the Commission, during 2006 the PTS continued with preparation for the Integrated Field Exercise (IFE) in 2008, reporting at the Working Group B sessions about developments and progress made as well as holding expert advisory group meetings, to discuss various issues related to planning, preparation and conduct of this exercise. The meetings produced important inputs to the IFE process, in particular the OSI Test Manual prepared by Working Group B and approved by the Commission, and other relevant guidance and advice to the PTS.

The PTS set up a task force to launch the preparation of the IFE. Progress included the choice of a location for the exercise on the former nuclear test site near Semipalatinsk, Kazakhstan, and the elaboration of a scenario.

Near the city of Slunj, Croatia, the PTS conducted a directed exercise (DE06) that focused on the set-up of a base of operations for an OSI. The PTS took advantage of the lessons learned during this exercise in defining the design and scenario of the IFE and in establishing technical specifications for core and auxiliary equipment, for which procurement procedures were initiated. An essential tool for the preparation of any field activity, the GIS became operational and supported many activities throughout 2006, ranging from field exercises to training.

Noble gas (xenon) equipment was selected and then tested and evaluated in various field activities in Seibersdorf, Austria. A high resolution gamma spectrometer, including prototype software to implement recommended measurement restrictions, was purchased. Three systems (ground penetrating radar, electromagnetic pulse monitoring and magnetic field mapping) for possible high resolution ground geophysical surveys were integrated into the OSI equipment pool. Interpretational routines for ground geophysical data treatment were evaluated and specific software for processing near-field passive seismic data for the Seismic Aftershock Monitoring System (SAMS) was being developed.



PREPARATION FOR INTEGRATED FIELD EXERCISE

As part of the preparation for the IFE, a meeting with representatives of the host country, Kazakhstan, took place in June 2006 in Astana, and an agreement was reached on setting up points of contact for both the Government of Kazakhstan and the Commission. In July, during an on-site visit to the former nuclear test site near Semipalatinsk, a suitable location matching the requirements for the possible types of scenario envisaged for the IFE was identified.

In September 2006, a task force comprising nine thematic groups was set up to assist the IFE project manager and immediately concentrated efforts on documentation, the scenario, logistics, equipment and financing. Involving experts from the States Signatories, consultants and PTS staff, the task force achieved progress in identifying key parameters for the design of the IFE. Further areas, including evaluation and medical and safety issues, were considered later by the task force.

Two meetings of the expert advisory group were held in May and December 2006 to discuss issues relevant to IFE preparation. The results of the meetings were considered as useful and important. Offers by States Signatories of equipment (hardware and software) as contributions in kind were evaluated for the exercise.

OSI OPERATIONAL MANUAL AND TEST MANUAL

During its sessions in 2006, Working Group B dedicated about five weeks of meetings to the elaboration of the draft OSI Operational Manual. In addition to the ongoing second round of the elaboration process, based on the annotated draft rolling text, work was done on an OSI Test Manual that Working Group B agreed to compile at its Twenty-Fifth Session to guide the IFE. Both undertakings were conducted under the chairmanship of the Task Leader for the draft OSI Operational Manual.

For the development of the OSI Test Manual, the PTS organized two OSI workshops (8–12 May and 24–28 July). The basis for this manual was the matured draft model texts produced by both the friends of the Task Leader and the PTS during the second round of elaboration of the draft OSI Operational Manual. In the process of compiling the Test Manual, the PTS contributed a wide range of comments based on practical lessons learned from its past OSI activities and provided the necessary support.



2006 directed exercise, Croatia: views of the base of operations during overflight activities.





2006 directed exercise, Croatia:
planning of activities at the base of operations.



2006 directed exercise, Croatia: testing of procedures
and equipment for soil sampling.

At Part II of its Twenty-Seventh Session, Working Group B considered the draft Test Manual resulting from the OSI workshops and agreed on the version that should be used by the PTS for testing during the IFE as well as for PTS activities and related training leading up to the IFE, as appropriate. The Test Manual includes text relevant to most sections of the annotated draft rolling text which were identified by Working Group B as priorities for testing at the IFE, it being understood that further material could be added to it. The general scope of the Test Manual was set to accommodate the overall scope of field activities designed for the IFE.

METHODOLOGY EXERCISES

The PTS completed the cycle of directed exercises for the preparation of the IFE with DE06, which focused on field logistics, in particular the setting up of a base of operations. This exercise took place in Vienna on 10 and 11 July 2006 for the advanced preparation of field deployment and near the city of Slunj, Croatia, from 12 to 22 July 2006 for the field activities within a military training facility. With the assistance of experts and equipment from supporting States Signatories, the participants deployed a mobile base of operations comprising tents and all necessary amenities, including, for the first time, a two way satellite based communication (VSAT) antenna for field communication testing purposes.

In addition, to improve the preparation for the IFE, the exercise included in its scope the testing of standard operating procedures in relation to techniques such as radionuclide analysis, magnetic field mapping and seismic measurement. DE06 also provided an opportunity to refine the definition of field medical support. Lessons learned have been implemented for the procurement of new core and auxiliary equipment as well as for the preparation of the IFE.

INFRASTRUCTURE

As planned, the GIS, a system for managing data with a spatial reference, was 95% complete at the end of 2006, substantial progress having been made through cooperation with the United Nations Cartographic Section.

Major improvements to the GIS took place in 2006. A GIS storage array, with a raw capacity of 20 terabytes, was installed and made operational at the computer centre with a direct secure link to the GIS laboratory. The GIS was successfully tested in DE06, introductory training courses and equipment field testing exercises, and was used to support the preparation of the IFE scenario. As a result the PTS has gained the technical ability to prepare basic maps, including elevation data, for any location in the world within a few hours.



Subsurface gas sampling for xenon during the testing of noble gas equipment at Seibersdorf, Austria. Plastic foil is used to seal the ground around the sampling hole to prevent contamination by the atmosphere. The foreground shows a sampling bag with a capacity of one cubic metre.

EQUIPMENT

Standard operating procedures for aerial and ground based geophysics were written and then tested in DE06. Procurement for a magnetometer, ground penetrating radar and an electrical conductivity measurement system was completed. The rest of the equipment necessary for the IFE has been assured to the PTS by States Signatories as contributions in kind.

Standard operating procedures were written and tested for SAMS. A new SAMS software development project for the analysis of the acquired seismic data was initiated in 2006. Technical evaluation for the procurement of two sets of SAMS equipment for testing and training purposes was completed and procurement was expected to follow in early 2007. Maintenance of all the existing SAMS equipment was conducted. SAMS equipment necessary for the IFE has been assured to the PTS by States Signatories as contributions in kind.

Comprehensive technical testing and evaluation of mobile xenon measurement systems were performed in Seibersdorf, Austria, concluding a three phase programme which began in 2003 to make prototype systems available for activities of the Commission. An experts' meeting to review the initial results of the development and testing and to discuss the future of the programme on mobile noble gas measurement was held immediately following the conclusion of the testing programme.

Prototype software for field analysis of beta-gamma coincidence xenon data was developed. Additional software for analysis of beta gated gamma data was under development.

Support for the development of on- and off-site measurement capability for argon-37 continued. An intercomparison measurement test was performed in which identical argon-37 samples were measured by a prototype mobile system and by a high sensitivity laboratory.

Noble gas equipment for both xenon and argon-37 measurements was offered to the PTS as contributions in kind for the IFE, and the PTS undertook one visit to an offering institution to evaluate the equipment offered and discuss terms of provision of equipment.

The procurement of the high resolution gamma spectrometer for field and laboratory use for testing and training purposes, including the factory acceptance test of the system, was completed. A beta version of the blinded gamma acquisition and analysis software for measurement restriction was under testing and evaluation. The software is based on off the shelf Genie-2000 gamma acquisition and analysis software.



2006 directed exercise, Croatia: magnetometer for towing underneath helicopter.



Above: Filling a dewar with liquid argon for cooling the ARIX-3F system.



Above right: SAUNA laboratory unit for analysis of xenon samples taken in the field. The system was developed for OSI and tested in Seibersdorf, Austria, in July–September 2006.

Below: Portable xenon sampling unit of the ARIX-3F system, which was developed for OSI and tested in Seibersdorf, Austria, in July–September 2006.

Through clarification visits, at least three vehicle-borne and aerial gamma monitoring tools necessary for the IFE were assured to the PTS as contributions in kind by States Signatories. A set of environmental sampling equipment for sampling subsoil gases, soil and water (deep and shallow) was procured. Initial testing of the subsoil gas sampling equipment was performed as part of the noble gas testing and evaluation in Seibersdorf.

