

## THE CTBT AND ON-SITE INSPECTIONS

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization is mandated to carry out the necessary preparations for the effective implementation of the verification regime of the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT) upon its entry into force. The Treaty bans nuclear explosions by everyone, everywhere: on the earth's surface, in the atmosphere, underwater and underground.



Equipment for an OSI is kept ready for rapid deployment at the Equipment Storage and Maintenance Facility outside Vienna.

An on-site inspection (OSI), involving a meticulous search of a designated area, will be one of the four elements of the aforementioned CTBT verification regime, the others being the International Monitoring System (IMS) with its network of 337 facilities around the entire globe, the International Data Centre (IDC) with its extensive data analysis capacities, and the consultation and clarification mechanism coupled with confidence building measures. The IMS and IDC are under provisional operation.

## THE INSPECTION TEAM

At the centre of an OSI will be a team of 40 inspectors, including experts in visual observation, seismology, geophysics, radionuclide detection and analysis, as well as supporting technology and expertise. The inspectors will be able to use a range of increasingly intrusive techniques to gather evidence within a designated inspection area of up to 1000 km<sup>2</sup>. Following the conclusion of an inspection, the Director-General of the (CTBTO) must deliver a report of the OSI findings to the EC, which will make the final assessment as to whether the Treaty has been violated, i.e. whether or not a nuclear explosion has taken place.

Deploying an inspection team into the field is extremely time critical, as there is only a narrow time window during which



In preparation for IFE14, the organization conducted a series of build-up exercises to practise each phase of an OSI.

After the Treaty's entry into force, a State Party may request an OSI should it believe that a nuclear explosion was carried out in violation of the Treaty.

Upon approval of the request by the Executive Council (EC) of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), facts gathered directly on the ground will help to establish whether or not a nuclear explosion did indeed take place. Thus, an OSI will constitute the final verification measure under the Treaty.

some of the conclusive evidence of a nuclear explosion may be obtained. The Treaty specifies that the CTBTO has only six days from receiving the inspection request to transport the inspection team with its estimated 150 tonnes of equipment to the territory of the inspected State Party.

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## INTEGRATED FIELD EXERCISE 2014

The Integrated Field Exercise 2014 (IFE14) – a simulation of an OSI – is being organized by the Preparatory Commission and shall take place in the Hashemite Kingdom of Jordan in late 2014. The exercise will be the largest and most technologically advanced simulated OSI ever conducted, allowing the testing of procedures, equipment and techniques in a comprehensive and integrated manner.



Ground based visual observation techniques and communications infrastructure were tested in Directed Exercise 2010 held in Jordan.



The decontamination of inspectors upon their return from missions in the inspection area during Build-Up Exercise III in 2013.

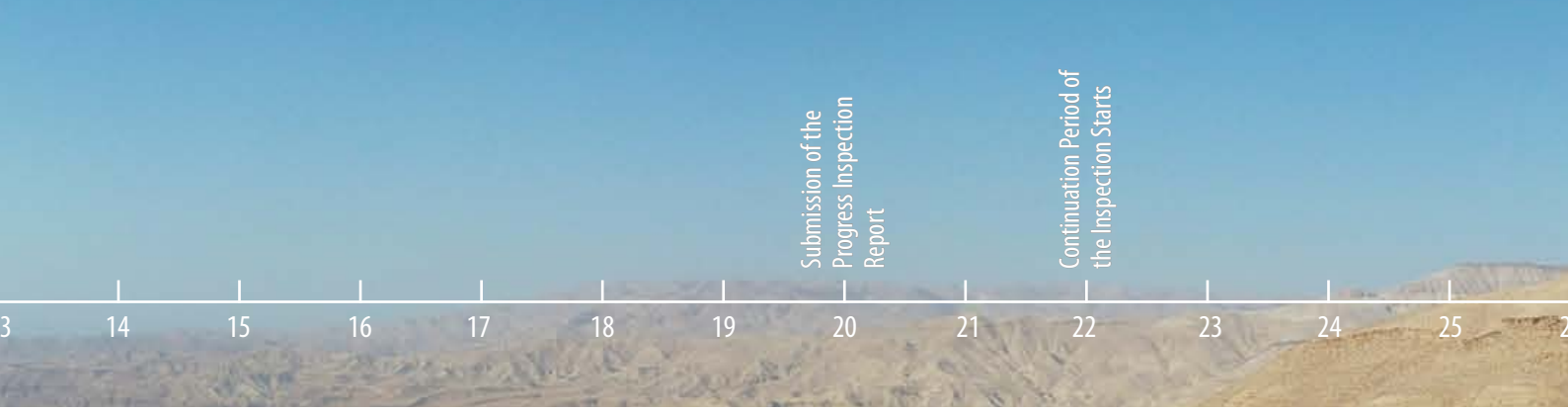
In order to provide a realistic environment for the effective execution of procedures, equipment performance, information management, inspection team functionality and report preparation by simulating a fully integrated exercise, technical experts nominated by States Signatories and Jordanian representatives are working closely to create a technically realistic, scientifically credible and intellectually motivating scenario for IFE14.

**The exercise will be the largest and most ambitious project ever undertaken by the Preparatory Commission and will reinforce the significant role of the CTBT in the international framework of nuclear non-proliferation and disarmament.**

## OSI EXERCISES

Exercises and field tests are efficient tools for testing OSI procedures, equipment and techniques, and thereby further developing the organization’s OSI capabilities. The previous IFE – the first such exercise to test aspects of an OSI in an integrated manner – was held in Kazakhstan in 2008, since which the OSI Division has held numerous exercises and field tests, a selection of which are indicated below.

DE09	2009 Finland	This directed exercise was devoted to the testing of passive seismic monitoring (SAMS) and geophysical equipment and procedures.
DE10	2010 Jordan	This directed exercise tested ground based visual observation techniques and communications infrastructure.
IFE14 BUE I	2012 Austria	The first IFE14 build-up exercise (BUE) tested the OSI launch phase over the course of five days, from submission of an inspection request to approval of the OSI mandate.
IFE14 BUE II/IV	2012 Austria	The second exercise, lasting one week, tested the OSI pre- and post-inspection phases, including point of entry activities, set-up of a base of operations, disassembly and departure.
IFE14 BUE III	2013 Hungary	The third exercise tested the inspection phase, including inspection team functionality and search logic concepts, equipment use, data collection and analysis and assembly of a preliminary findings document.
COMS and MSIR Field Tests	2013 Jordan	Two field tests to assess communications infrastructure and newly acquired multispectral imaging equipment held in late 2013.



## IFE14 INSPECTION TECHNIQUES

The Treaty defines specific activities and techniques that can be applied during an OSI, starting with less intrusive and moving to more intrusive techniques.



Visual observations and other measurements were made from the air during Build-Up Exercise III in Hungary in 2013.



Surrogate Inspectors check a site for radionuclides during an OSI exercise.

**The inspection team in IFE14 will utilize almost every technique permitted by the Treaty in order to determine whether a nuclear explosion has taken place.**

Making substantial progress on the techniques used in the Integrated Field Exercise 2008 (IFE08), the inspection team in IFE14 will utilize the techniques permitted by the Treaty shown below. These techniques will help the inspection team gather evidence that sheds light on the event that led to the request for an OSI.

Only two techniques permitted by the Treaty, **resonance seismometry** and **drilling**, will not be used during IFE14. Resonance seismometry identifies any underground cavities through the recording of seismic background. Inspectors use drilling to obtain samples from the site of the suspected explosion to be tested for radioactivity.

Visual observation	Visual observation with still and video photography from both the ground and the air helps the inspection team identify anomalies or artefacts where additional inspection activities may be warranted.
Multi-spectral imaging including infrared	Multispectral imaging including infrared provides additional visual information about anomalies or artefacts in surface and near-surface features to help the inspection team identify areas where additional specific inspection activities may be warranted.
Gamma spectroscopy and ground based surveys	Measurements of gamma radiation and energy resolution help the inspection team to identify possible deposition of relevant man-made radioactive isotopes that may be related to the triggering event.
Environmental sampling	The collection of samples, such as air, soil, vegetation and water, for analysis in the field laboratory helps the inspection team to determine if any relevant radioactive isotopes are present.
Seismological monitoring of aftershocks	Measuring micro-seismic events that occur after an underground explosion may help the inspection team locate areas of interest for further investigation.
Magnetic field mapping	Measuring deviations in the earth's magnetic fields can indicate the presence of infrastructure elements of an underground explosion, such as pipes, cables or shafts.
Gravitational field mapping	Looks for local changes in the earth's gravity which can be directly related to rock density. A gravity anomaly could indicate a cavity created by an underground nuclear explosion.
Electrical conductivity measurements	Measuring electrical conductivity helps the inspection team to identify metallic objects near the surface or disturbances in deeper underground geological structures, such as cavities or changes in the water table.
Active seismic surveys	Seismic signals are artificially created, and the reflection or refraction of these signals is measured to identify anomalous areas in underground geological structures.



## IFE14 INSPECTION PHASES

IFE14 is divided into four phases, each of which will be played as close as possible to the time lines defined by the Treaty.



One of the geophysical inspection techniques used by the inspection team is the measuring of electrical conductivity in the ground.



Inspectors use HF, UHF and VHF as well as satellite based communications to stay in contact with the base of operations and CTBTO headquarters in Vienna.

### Launch Phase

IFE14 will be initiated with the submission of an OSI request from a State Party on the basis of a suspicious event. Only States Parties can trigger an OSI based upon data collected through the IMS or produced by national technical means consistent with general principles of international law. The EC will make a decision within 96 hours of its receipt of the request. Upon receipt of the request, the Operations Support Centre (OSC) is activated at CTBTO headquarters. Its role is to initiate all administrative and operational tasks to get the inspection team to the point of entry (POE) of the inspected State Party (ISP) within six days of the receipt of the OSI request.

### Pre-Inspection Phase

The pre-inspection phase is 72 hours in length. The first 36 hours cover the arrival of the inspection team at the POE (in the case of IFE14, within the territory of the Hashemite Kingdom of Jordan), the exercise of a number of Treaty rights for both the ISP and the inspection team (negotiations, briefings, equipment checking) and the subsequent transfer of the team and its equipment to the inspection area. During the second 36 hours, the inspection team will work to establish the base of operations (BOO) and prepare to conduct inspection activities.

### Inspection Phase

An inspection phase is initially up to 60 days from the approval of the inspection request, with a possible extension of a further 70 days requiring the approval of the EC. The inspection phase consists of up to three parts: (i) an initial period of up to 25 days from the approval of the inspection, during which a limited set of techniques can be used; (ii) a continuation period including the extension period, which starts following the submission of a progress inspection report, during which OSI techniques allowed under the Treaty, with the exception of drilling, can be utilized and (iii) drilling for a radioactive sample, which requires a special vote and approval by the EC. It is envisaged that during IFE14 an initial period of 10 days and a continuation period of 12 days shall be played.

### Post-Inspection Phase

Once the inspection is declared over, the inspection team has 24 hours to meet with the ISP representative to review the preliminary findings document (PFD) and to clarify any ambiguities. The ISP must then countersign the document to indicate that it has taken note of its content. In parallel, the inspection team shall dismantle the BOO, pack all equipment and depart as soon as practically possible. The Director-General will utilize the PFD to create an inspection report, which will be forwarded to all States Parties and the EC to assess whether non-compliance with the Treaty has occurred.

## JORDAN: THE HOST COUNTRY

The Hashemite Kingdom of Jordan will host IFE14 and is providing an area of approximately 1000 km<sup>2</sup> on the banks of the Dead Sea – some 100 km south-west of Amman – where the exercise will be conducted. Jordan has a rich variety of geological features which will allow the testing of OSI aspects under realistic conditions.



*Jordan is rich in geological and geophysical features which will support the implementation of an integrated field exercise.*



*The host country will provide an inspection area of up to 1000 km<sup>2</sup> on the banks of the Dead Sea.*

These features include landslides along the eastern shore of the Dead Sea, recently created sinkholes as a result of the Dead Sea water level lowering in Al-Hadeetha and successions of water terraces in the Al-Mujib Delta. The geology is therefore helpful in the development of a technically credible scenario for the exercise.

***Jordan is home to a rich variety of geological features including sinkholes and landslides, which will allow the testing of OSI aspects under realistic conditions.***

## ONGOING COOPERATION BETWEEN JORDAN AND THE PREPARATORY COMMISSION

IFE14 builds on a long history of close cooperation between Jordan and the Preparatory Commission. Jordan signed the Comprehensive Nuclear-Test-Ban Treaty following its opening for signature on 26 September 1996 and ratified the Treaty in August 1998. That same year, Jordan and the PTS concluded a facility agreement covering the hosting of the IMS auxiliary seismic station AS56.

In recent years, Jordan hosted a National Data Centre development workshop on capacity building for Middle East and South Asian States in September 2010, a directed

exercise on ground based visual observation techniques and communications equipment in November 2010 and an infrasound workshop in November 2011.

In the run-up to IFE14, Jordan hosted a second communications field test and a multispectral imaging field test, as well as a training workshop on the conduct of an OSI for national authority representatives.



*The base of operations during BUE III in Hungary in 2013.*



*BUE III participants, a number of whom shall participate in IFE14.*

## IFE14 EVALUATION

Using a combination of desk reviews, observations, interviews and questionnaires, an independent evaluation team shall evaluate the conduct of IFE14 with a view to establishing progress made since the IFE08 in bridging previously identified operational capability gaps, identifying further areas for improvement and helping shape and inform subsequent efforts of the organization towards further developing operational capability and readiness for entry into force of the CTBT.

***The conduct of IFE14 will be a major step in the further development of the OSI regime and a milestone in the work of the Preparatory Commission.***

## FURTHER INFORMATION

For more information about IFE14 and OSI, visit the CTBTO web site at: [www.ctbto.org/ife14](http://www.ctbto.org/ife14) where you can also subscribe to the IFE14 e-Newsletter for regular updates on the preparations and conduct of IFE14.

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