



# ON-SITE INSPECTION (OSI) THE FINAL VERIFICATION MEASURE

**“The CTBTO's verification regime  
can detect a nuclear test anywhere  
in the world, but definitive evidence  
can only be gathered on the ground  
through an on-site inspection.”**



**Robert Floyd**  
EXECUTIVE SECRETARY OF THE CTBTO



# THE ULTIMATE VERIFICATION MEASURE: ON-SITE INSPECTION (OSI)

On-site inspection (OSI) is a crucial component of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) verification regime.

Such an inspection can only be requested and approved by States Parties once the CTBT has entered into force to establish whether a nuclear explosion has been carried out.

Until then, the Preparatory Commission is charged with building up the on-site inspection capability – training potential inspectors, preparing equipment and a detailed Operational Manual, and testing procedures in exercises both in Vienna and in the field.

A key benefit of an on-site inspection regime is that it deters potential violators from conducting nuclear explosions in the first place, and therefore increases confidence that States will comply with the Treaty.

The CTBT prescribes how an inspection is triggered: how it is prepared and conducted, what techniques and procedures can be applied, which information an inspection report should contain, and what possible steps could follow the report's examination by the Organization's main executive organ, the Executive Council, after entry into force of the CTBT.

The process involves an international team of 40 inspectors, including experts in visual observation, seismology, geophysics, radionuclide detection and analysis, as well as supporting technology and expertise. Team members may change during the course of the inspection depending on the required technical expertise.

Inspectors will be able to use a range of techniques to gather evidence within a designated inspection area of up to 1000 km<sup>2</sup>.

# THE FOUR PHASES MEASURED IN HOURS AND DAYS:

## 1 LAUNCH PHASE

The launch phase starts with a request from a State Party on the basis of a suspicious event, detected by the International Monitoring System (IMS), but also from data generated by national technical means of verification.

This request must contain detailed information about the suspicious event, including estimated time and location, the probable environment of the event (i.e. whether it has taken place underground, under water or in the atmosphere) and which State Party or States Parties would be inspected.

The request triggers a chain of activities:

- The Director-General has only two hours to acknowledge receipt of the request and six hours to communicate the request to the State Party sought to be inspected.
- The Director-General seeks clarification from the State Party that is the subject of the inspection request. The State Party must give an explanation within 72 hours.
- The Director-General then sends the State Party's explanation, along with relevant information on the suspicious event, to the Executive Council.
- The Executive Council approves or refuses the request within 96 hours of receiving it.
- At the same time, an Operations Support Centre (OSC) is established at the CTBTO headquarters to initiate all administrative and operational tasks to prepare and deploy the inspection team to the field within six days of the receipt of the OSI request.
- The launch phase finishes with the approval of the OSI when the Director-General issues the finalized inspection mandate, outlining the details of the planned inspection and departure of the team for the State Party that is to be inspected.

Deploying the inspection team into the field is extremely time critical because there is a narrow window during which some of the conclusive evidence for a Treaty violation can be obtained. The occurrence of seismic aftershocks after an event, for instance, declines with every passing day. Equally, specific radioactive elements, i.e. particulates and noble gases, dissipate quickly due to their relatively short half-lives.



*OSI Equipment at CTBTO's storage facility  
located near Vienna*



# 2 PRE-INSPECTION PHASE

The pre-inspection phase, 72 hours in length, covers the arrival of the inspection team in the State Party where the OSI is to take place. This phase involves a range of activities at the point of entry (usually an airport):

- Negotiations, briefings, and equipment checks
- The transfer of the inspection team from the point of entry to the inspection area
- Establishing the base of operations



*The helicopter used for overflight as the team searches for evidence of nuclear testing during Integrated Field Exercise 2014 (IFE14) in Jordan*

# 3 INSPECTION PHASE

The inspection phase is commonly divided into two parts – an initial period and a continuation period.

During the initial period, the inspection team begins with the least intrusive techniques and submits a progress report within 25 days after approval of the inspection by the Executive Council.

Those techniques include visual observation to detect anomalies on the surface, radiation monitoring to identify elevated gamma radiation and the emitting substances, environmental sampling, and analysis to detect relevant radioactive particles and noble gases, and seismic aftershock monitoring to identify geological changes in the underground.

Unless a majority of the Executive Council members decide to discontinue the inspection after the initial period, the inspection continues for up to 60 days. In exceptional cases and when the team considers an extension necessary, the Executive Council can extend the time frame of the inspection by an additional 70 days to a total maximum of 130 days.

If that is the case, the inspectors can use more intrusive techniques, such as ground penetrating radar and active seismic surveys. Drilling for radioactive samples requires special approval from the Executive Council.

*An OSI specialist carries a magnetometer, an instrument that measures deviations in the Earth's magnetic field and helps to identify cavities that may have been caused by an underground nuclear explosion*



# 4 POST-INSPECTION PHASE

Once the inspection phase concludes, the inspection team has 24 hours to submit a preliminary findings document. This is a report of its activities and findings, which after review by the Inspected State Party (ISP), provides a basis for the final inspection report.

The inspection report is prepared at the Technical Secretariat and the draft is sent to the ISP for review and comments. The final report is sent by the Director-General to all States Parties and the Executive Council. They will assess whether non-compliance with the Treaty has occurred.

In parallel, the inspection team dismantles the base of operations, packing all equipment and departing from the ISP.





# OSI EXERCISE

Exercises play an integral role in efforts to build up the OSI element of the verification regime as they allow various inspection activities, techniques, processes, and procedures to be tested and validated in a partially integrated manner in the context of a tactical scenario environment.

The most comprehensive of these are Integrated Field Exercises (IFE). Conducted on the ground, IFEs are based on a fictional but technically realistic, rationally coherent, temporally logical, and intellectually motivating scenario that tests almost the full range of inspection procedures and techniques as a continuous and integrated process.

The first of these, IFE08, took place in September 2008 at the former Soviet nuclear testing ground at Semipalatinsk, Kazakhstan. The second, IFE14, was held in Jordan in late 2014 and the next – delayed by the COVID-19 pandemic – is expected to take place in 2025.

In preparation for an IFE, the CTBTO's OSI Division conducts various types of exercises, including office based tabletop exercises, directed exercises that focus on testing new developments and establishing operational capability in one or a limited set of techniques, and build-up exercises to practice one or more phases of an OSI in an integrated manner and providing a platform to review policy, operational, operations support, logistical and technical capabilities from a holistic, cross-cutting perspective.

In June 2022, CTBTO's OSI Division organised the first tabletop exercise for the Organization's senior managers, including the Executive Secretary and Division Directors, providing them with an opportunity to role-play challenging scenarios that could emerge upon receipt of an on-site inspection request.

