

On-Site Inspection: One of the Final Verification Measures for Nuclear Explosions Test

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Abstract: *The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear weapon tests. Its unique verification regime is designed to detect nuclear explosions anywhere on the planet – in the oceans, underground and in the atmosphere. On-site inspections (OSIs) constitute the final verification measure under the Treaty and it can be invoked only after the Treaty's Entry into Force (EiF). The EiF is carried out when 8 countries/ states signatories as expressed in CTBT Annex II complete in ratification. A Member State may request an OSI inspection if the analysis of monitoring data indicate that a nuclear explosion was carried out in violation of the CTBT at its neighbouring countries. Facts gathered directly on the ground during an inspection will help States to establish whether or not a nuclear explosion did indeed take place. After approving the OSI request by Executive Council (EC) or Director General (DG), it will be known that how long the OSI is carried out, what techniques and activities are used, what are the roles of Inspection Team (IT) and Inspected State Party (ISP) in the inspection area (IA).*

Keywords: *On-Site Inspection, nuclear explosive test, Resonance seismometry,*

1. INTRODUCTION:

The treaty (the book of CTBT) prescribes each signatory State to undertaken the basic obligations in Article I. The Article IV deals with verification. There are four elements established in a verification regime: (1) An International Monitoring System (IMS) (2) Consultation and Clarification (C&C) (3) On-Site Inspection (OSI) and (4) Confidence-building measures (CBM) [2]. The IMS will consist of 337 facilities (321 monitoring stations and 16 radionuclide laboratories) located in 89 countries around the globe. The monitoring stations generate data which are transmitted to the International Data Centre (IDC) at the headquarters of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in Vienna. Data and analysis results are shared with Member States. The IMS facilities monitor the planet continuously for any sign of a nuclear explosion [1]. The system uses four stations. The three stations of Seismic, hydroacoustic and infrasound monitor underground, the oceans, and the atmosphere respectively. Radionuclide stations detect radioactive debris from atmospheric or underwater nuclear explosions or nobles gases from underground explosions [1]. After detecting the any nuclear explosive test by the IMS, Inspectors measure on the ground or on-site to get the facts which are agreed with the data from the IMS. So the OSI is complement the verification regime's other elements: IMS, IDC and the Global Communications Infrastructure (GCI) [3].

1.1 The Purpose of On-Site Inspection

The Treaty states that “The sole Purpose of an on-site inspection shall be to clarify whether a nuclear weapon test explosion or any other nuclear explosion has been carried out in violation of Article I and, to the extent possible, to gather any facts which might assist in identifying any possible violator.”

2. A REQUEST FOR AN ON-SITE INSPECTION:

The request for an OSI must be the identification of an ambiguous event shown in Figure 1, in which the suspicious data might be directly related to a nuclear test explosion. Once this information has been identified, the second step of the verification regime, the C&C comes into play (Figure 1). Its request bases on reliable information collected through the IMS or by NTM shown in Figure 2. The State can ask the request from the Requesting State Party (RSP), the EC and the DG appointed by the Conference of States Parties (CSP). The ISP which is the country that is being inspected works together with EC, DG and Inspection Team (IT) under the CSP upon request of OSI shown in Figure 3. Once the EC has approved an OSI, the DG shall designate an Inspection Team (IT) and prepare a Mandate to instruct the IT what is expected of it. The Technical Secretariat (TS) is responsible for carrying out the verification and many other functions, including receiving and processing requests for OSIs [4]. In the first clarification case of RSP to RSP of Figure 1, both the Receiving State Party and the Requesting State Party may want to keep the DG informed of this (request and response). In the second case, the DG then makes any appropriate information in the possession of the TS available to the State Party concerned and informs the EC of both the request and the response if the Requesting State Party so wishes.

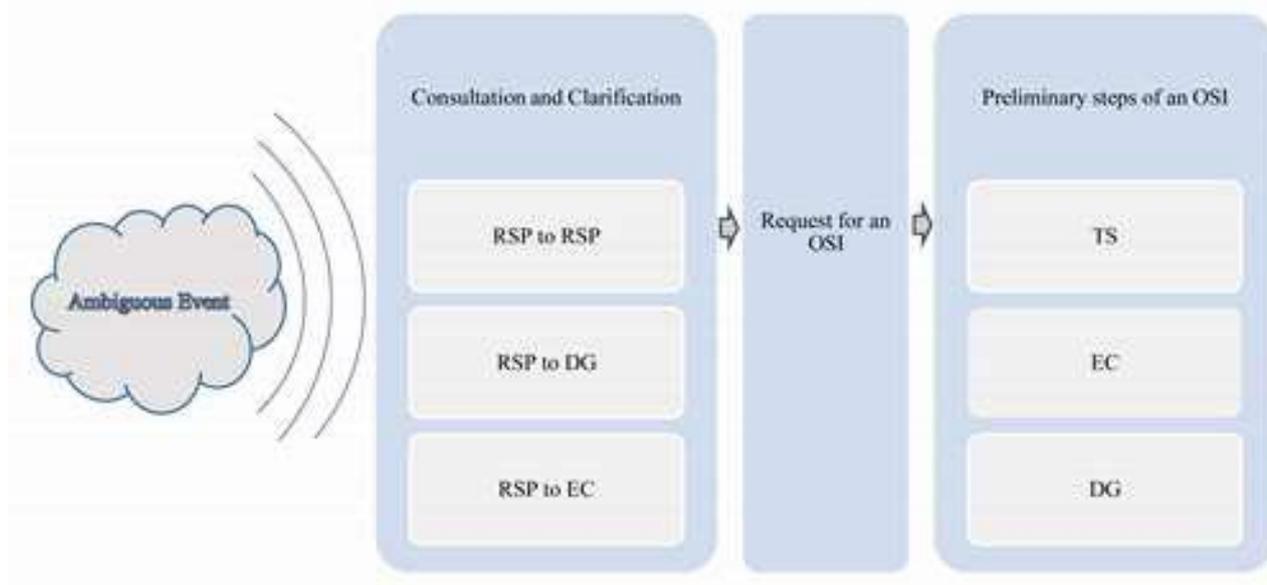


Figure 1 States Parties to follow through a Process of C&C Before a request for an OSI is made

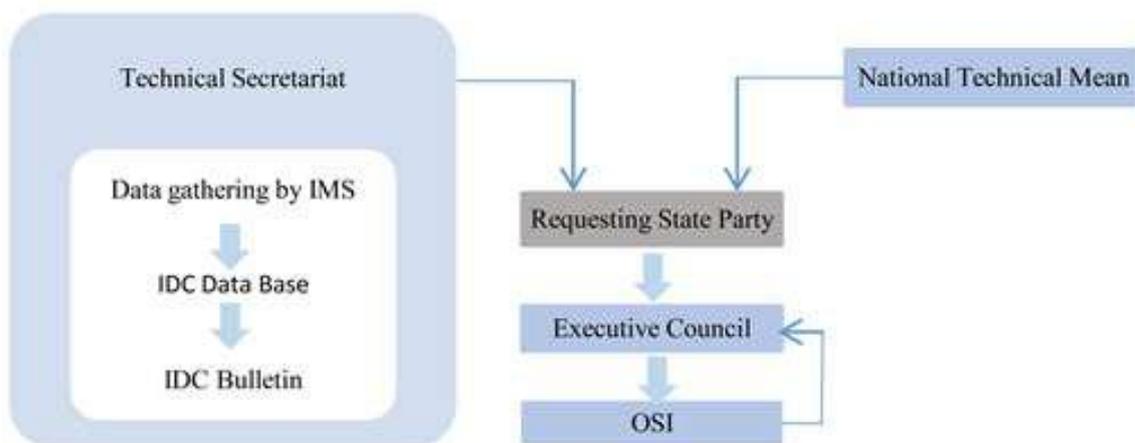


Figure 2 Information flows

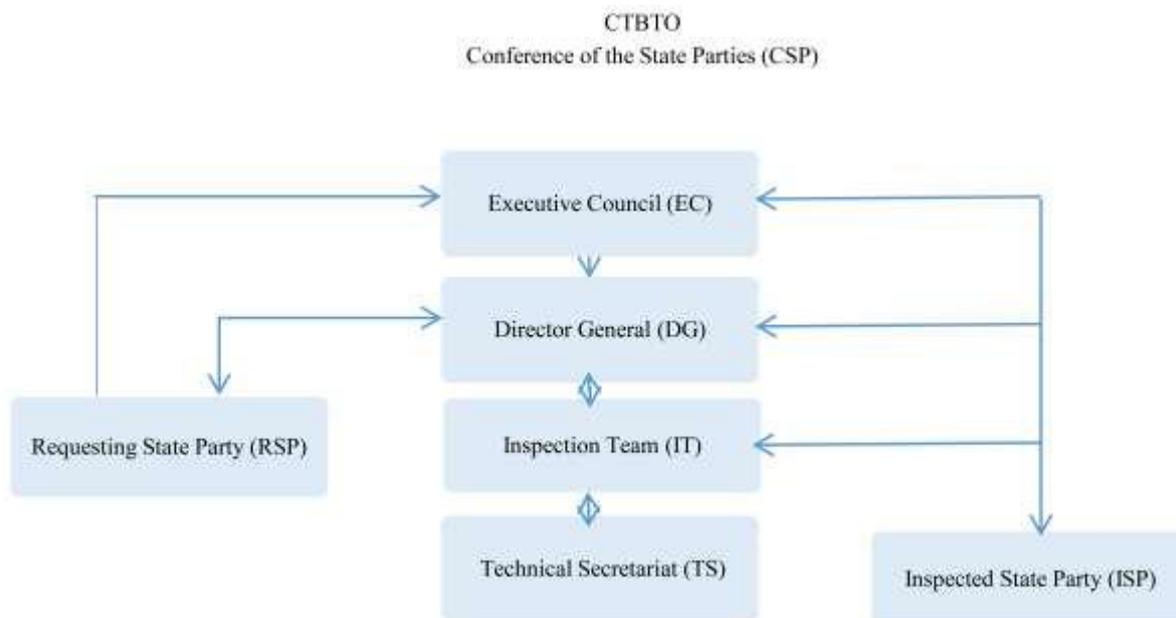


Figure 3: RSP request and ISP works together with EC, DG and IT under CSP

The Requested State Party follows the rules of Treaty:

- To keep the OSI request within the scope of the Treaty. [Treaty-Article IV, Paragraph-35 (T-AIV, Para-35)]
- To provide in the request only legitimate information. (T-AIV, Para-36 & 37)
- To refrain from unfounded or abusive OSI requests. (T-AIV, Para-36).

According to Paragraph 67, if the OSI is not approved/terminated in case of uncertain OSI request, EC will consider and decide on methods to redress the following situations:

(a) Requiring the RSP to pay for the cost of any preparations made by the TS (b) Suspending the right of the RSP to request an OSI for a period of time, as determined by the EC; and to serve on the EC.

3. PERIODS OF ON-SITE INSPECTION (OSI):

In order for the request for an OSI to be approved, at least 30 (out of 51) members of the EC must agree to this by vote. A decision is made by the EC within 4 days of OSI request's receipt shown in Table 3.1. Then the DG initiates preparations in the TS for an OSI without delay and issues an Inspection Mandate. The inspection mandate includes the decision of the EC, the name of ISP, the IA, the planned types of activity of the IT, the point of entry, any transit or basing points, the name of the IT leader, the names of members of the IT, the name of the proposed observer and the list of equipment [Paragraph 42 of Part II of the Protocol (P-Part II, Para-42)]. The IT will arrive at the point of entry at 2 days as shown in following Table 3.2. The IT will begin the inspection activities at 5 days and submit the progress inspection report to EC at 25 days. Then IT will request to extend the inspection from EC at 60 days. The IT including 40 inspectors and inspection assistants will depart from ISP territories in the 130 days after terminating OSI with preliminary findings document (PFD) report.

Table 3.1. Timelines for pre-inspection periods (AIV, Para-38-53)

S	RSP submits an OSI Request
S+2h	DG acknowledges receipt of a request for an OSI
S+6h	DG informs ISP of a request for an OSI on its territory
S+1 day	DG informs all states and EC of the existence of request
S+3 days	ISP provides the explanations and other relevant information available to DG
S+ 4 days	EC deliberates on whether to approve the request. At least 30 States needed to approve it
S+6 days	IT arrives at the Point of Entry

S means the request's receipt

Table 3.2. Timelines for inspection periods (AIV, Para-46-50)

Initial	D= S+96h	EC Decision
	D+2	IT arrives at POE
	D+3.5	IT arrives at IA
	D+5	IT begins inspection activities
	D+25	IT Progress Inspection Report
Continuation	D+25+3	Continuation is approved
		IT requests to extend inspection
Extension	D+60	Beginning of Extension period
	D+130	End of OSI

D means decisive day from EC

4. THE ROLE OF INSPECTION TEAM (IT):

In order of the efficient and timely accomplishment of the Inspection Mandate, the IT conduct the OSI with the least to more intrusive procedures, with a search of information and data which is relevant to the Inspection, with a minimum at interfered by ISP and with the inspection techniques and activities specified in Paragraph 69 of Treaty including the documentation and collection of facts. The area of an on-site inspection shall be continuous and its size shall not exceed 1,000 square kilometres (P-Part II, Para-3). IT will make a negotiation with ISP at the point of entry to support the meals, drinking water, accommodations and medicines for health and safety. IT will request ISP to transit to the Base of Operation (BOO) related to IA with escorts for their security. Besides, IT will request daily vehicles for inspection activities, inspection equipment related to BOO, decontamination procedures, required documentation, information about weather forecasts, geology, topography and terrain, communication and navigation arrangements. Furthermore, The IT will make an initial inspection plan with the help of ISP. The members of the IT shall have the

right at all times during the OSI to communicate with each other and with the TS. For this purpose they may use their own duly approved and certified equipment with the consent of the ISP (P-Part II, Para-62). The following inspection techniques and activities for IT may be conducted and used, in accordance with the provisions on managed access, on collection, handling and analysis of samples, and on overflights:

Table 4.1. Inspection Techniques and Activities

Sir	Techniques	Activities	
1	Position finding	to confirm the boundaries of the inspection area and establish co-ordinates of locations	from the air and at the surface
2	Visual observation, video and still photography and multi-spectral imaging, including infrared measurements	to search for anomalies or artifacts	at and below the surface, and from the air
3	gamma radiation monitoring and energy resolution analysis	to search for and identify radiation anomalies	above, at and below the surface, from the air, and at or under the surface
4	Environmental sampling and analysis	to detect anomalies about solids, liquids and gases	above, at and below the surface
5	Passive seismological monitoring	for aftershocks to localize the search area and facilitate determination of the nature of an event	-
6	Resonance seismometry and active seismic surveys	to search for and locate underground anomalies	-
7	Magnetic and gravitational field mapping, ground penetrating radar and electrical conductivity measurements	to detect anomalies or artifacts	at the surface and from the air
8	Drilling	to obtain radioactive samples	-

According to P-Part II, Para-60 during the on-site inspection, IT shall have rights and obligations as follows:

IT Main Rights

- To determine how the inspection will proceed
- To modify the inspection plan
- To request clarification regarding ambiguities arising during the inspection
- To collect and document facts related to the purpose of the inspection

IT Main Obligations

- To take into account the ISP recommendations and suggested modifications to the inspection plan.
- To use only those techniques specified in Part II, Paragraph 69
- To refrain from activities and to neither seek nor document information that are not relevant to the purpose of the inspection
- To respect the confidentiality and the Health & Safety regulations of the ISP
- To take into account in report of data and ISP’s explanations about the national monitoring networks and other sources
- To provide ISP copies of the information and data collected if request

5. THE ROLE OF INSPECTED STATE PARTY (ISP):

The ISP shall provide for or arrange the amenities necessary for the IT, such as communication means, interpretation services, transportation, working space, lodging, meals, and medical care (P- Part II, Para-11).

The ISP may support the IT’s requirements according to base upon condition of its country. The ISP must provide IT security, transportation, navigation and communication during the inspection periods. The ISP can protect the sites not related to the inspection purpose, disclosure of confidential information and national security interest. According to P-Part II, Para-61 & AIV, Para-57 during the on-site inspection, ISP shall have rights and obligations as follows:

ISP Main Rights

- To make recommendations at any time to the IT regarding possible modification of the inspection plan

- To take measures it deems necessary to protect national security interest and to prevent disclosure of confidential information
- To have representatives to accompany the IT during the performance of its duties and observe all inspection activities carried out by the IT
- To provide additional information and to request the collection and documentation of additional facts it believes are relevant to the inspection
- Rights regarding photographing and photographic and measurement product
- To provide the IT, from its national monitoring networks and from other sources, with data and explanations on the nature of the event that triggered the request

ISP Main Obligations

- To provide access within the inspection area for the sole purpose of determining relevant facts, taking into account confidentiality and constitutional obligations
- Not to invoke its rights in order to conceal a violation of its obligations under the Treaty
- Not to impede the ability of the IT to move within the inspection area and to carry out inspection activities
- To provide the IT with such clarification as may be necessary to resolve any ambiguities that arise during the inspection (P-Part II, Para-6, g)

5.1 The Managed Access

Access means both the physical access of the IT and inspection equipment and the conduct of inspection activities within the IA. The rights and obligations the ISP has with regards to managing access (T-AIV, Para-57 & P-Part II, Para-86-96) as the following:

Rights of ISP(Managed Access)

- To protect national security interests and to prevent disclosure of confidential information (57b).
- To follow ISP constitutional obligations with regard to proprietary rights or searches and seizures (57c).
- To take measures to protect sensitive installations, locations and confidential information(88a)
- To make the final decision regarding any access (Protocol, Part II, Paragraph 88c)
- To manage access into areas and buildings, measurements and other activities(89d,90,91)

Obligations of ISP(Managed Access)

- To demonstrate its compliance with the Treaty and to make efforts to satisfy the requirements of the inspection mandate through alternative means(57a)
- To enable the IT to fulfill its mandate (91).
- To provide access within the inspection area for determining relevant facts (57c, 87).
- Not to conceal any violation of its basic obligations (57d).
- Not to impede the ability of the IT to carry out inspection activities (57d).

5.2 Photography Restrictions (P-Part II, Para-61, e)

ISP has the right to examine all photographic products, to retain any photographs or parts thereof showing sensitive sites not related to the purpose of the inspection, to receive duplicate copies of them, to retain photographic originals and first generation of them, to put photographs or parts thereof under joint seal within its territory and to provide its own camera operator to take still/video photographs as requested by the IT.

5.3 Measurements Restrictions (P-Part II, Para-89)

The ISP has the right to protect confidential information including: (a) shrouding of sensitive displays, stores and equipment, (b) restricting measurements of radionuclide activity and nuclear radiation to determining the presence or absence of relevant types and energies of radiation and (c) restricting the taking or analysing of samples to determining the presence or absence of relevant radioactive or other products.

5.4 Over-flights Restrictions (P-Part II, Para-71-85)

The IT can conduct an overflight over the IA for orientation and data gathering. Over-flights are subject to ISP's aviation rules and regulations. The ISP has the right to provide the aircraft, personnel on board, including Crew, 4 IT, 2 ISP representatives, an Interpreter and Camera Operators, all on-board equipment, including inspection equipment. The ISP has the right to impose restrictions prohibitions on the overflight of sensitive sites not related to the purpose of the inspection. Restrictions may relate to the flight time (not more than 12 hours), the flight altitude (1,500 metres above the surface), the number of passes and circling, the duration of hovering, the type of aircraft (a relatively slow fixed or rotary wing aircraft), the number of inspectors on board, and the type of measurements or observations.

Any additional over-flight can be conducted only with the approval of the ISP. However, the ISP is bound by the Treaty to make every reasonable effort to provide alternative means of inspection once it imposes restrictions, if the

IT considers that the restrictions or prohibitions on over-flight of sensitive sites may impede the fulfilment of its mandate. If the ISP does not support the aircraft, it shall be provided or rented by the TS (P-Part II, Para-82). [5]

6. THE NUMBER OF INSPECTORS AND QUALIFICATIONS:

An IT consists of a maximum of 40 Inspectors and Inspection Assistants (P-Part II, Para-9, 14-25). They are nominated for designation by the State Parties, or the TS, by the DG after the EiF of the Treaty. The TS keeps inspector list up-to-date and notifies all State Parties of any additions or changes to the list. It provides training for Inspectors. An OSI can only be carried out by qualified Inspectors. The inspectors are assisted by specially designated Inspection Assistants such as Technical and Administrative personnel, Air Crew and Interpreters. Inspectors come from various fields such as scientific institutions, national authorities, the military, government employees, contractors to governments and other. Some skills of IT members may need to possess: managerial, clerical/administrative, scientific or technology-orientated skills, logistics and communication, observational/ photo- graphic, medical, translation and interpretation and other. IT members are expected to demonstrate: professionalism, respect for other cultures/religions, integrity and honesty, not to use an OSI as an opportunity for business or commercial gain, team work competence, to represent the international organization and not to pursue national interests.

6.1 Privileges and Immunities

Each State Party shall issue the necessary visa or travel documents for this purpose no later than 48 hours after receipt of the application or immediately upon arrival of the IT at the POE on the territory of the State Party (P-Part II, Para-26). Paragraph 27 of Part II of the Protocol states that members of the IT shall be accorded the inviolability enjoyed by diplomatic agents pursuant to Article 29 of the Vienna Convention on Diplomatic Relations. Among others, this includes:

- IT members' living quarters/office premises shall be inviolable and protected.
- IT members' paper/correspondence/records shall be inviolable. IT has the right to use codes to communicate with the TS.
- IT members' samples and equipment shall be inviolable.
- They shall be exempt from dues and taxes.
- They are permitted to bring, without customs duties or related charges, articles for personal use.
- They are accorded the same currency and exchange facilities as accorded to representatives on temporary official missions.

7. CONCLUSION:

The OSI is the final verification measure and each state party has the right to request the OSI. The OSI is carried out only after Entry into Force (EiF) of the Treaty. The 40 inspectors and inspection assistants are from various fields of seismic, geology, geophysics and radionuclide. IT is important to gather the facts about inspection purpose of treaty as well as ISP in providing the requirements of IT and preventing the national security interests and confidential information enclosure. The IT will use the approved inspection techniques and equipment in the 1000 km² of inspection area up to 130 days of inspection duration.

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