**OSI: DIPLOMATS ON SITE**

On-site inspection (OSI) is one of the elements of the verification regime of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). The sole purpose of an OSI is 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.

A request for OSI shall be based on information collected by the International Monitoring System (IMS), on any relevant technical information obtained by national technical means of verification in a manner consistent with generally recognized principles of international law or on a combination thereof.

Provisional Technical Secretariat (PTS) and the States Signatories of the Treaty have led to significant progress in the development of the OSI mechanism. A large number of OSI exercises and training activities have been carried out in different environments and an information-led OSI capability has been developed. OSI key elements are signatures and observables, inspectorate, techniques and equipment, inspection team methodology, and logistics and operations support.

**OSI PROCESS**

Once an OSI is launched, a designated inspection team of up to 40 inspectors will conduct inspection activities in an inspection area of up to 1000 square kilometers, using the techniques listed in the Protocol to the CTBT, Part II, para graph 69. An OSI could last for a total of 130 days. Whether the inspection team could fulfil the OSI mandate or not depends not only on the team, but also on other factors, including scientific, technological, natural and political. With regard to the development of OSI capabilities, the physical evidence that proved whether the Treaty was violated or not is at the center of discussions during OSI.

When an OSI request is approved, a designated inspection team with knowledge and expertise on NTE signatures and observables should follow the search logic and apply the inspection techniques specified in the Protocol to the CTBT, Part II, paragraph 69, using certified equipment to conduct an effective and timely OSI and report to the Director-General of the Comprehensive Nuclear-Test-Ban Treaty Organization any factual findings relevant to the purpose of the inspection. DG has to report to Executive Council on issues related to OSI, mainly if an interesting signature or observable was found.

Human factors are applicable to the conduct of an OSI. In order to fulfil the OSI mandate, inspection team members must possess not only a high degree of professionalism, but also adequate physical strength, good health condition, adequate mental and psychological status and high environmental adaptability. Moreover, they should have received specific inspectorate training and leadership training. Those are key requirements for developing and maintaining a robust inspection team with the required technical competencies and soft skills. Many of those requirements depend on the OSI environments; for instance, an inspector’s psychological status could be negatively affected by challenging conditions, such as bad weather, daylight duration, welfare situation and extreme environmental conditions.

Since the Treaty opened for signature in 1996 and the establishment of the Preparatory Commission in 1997, the PTS has engaged in developing the OSI element of the verification regime. Significant progress in the development of OSI capabilities has been made through the planning and conduct of numerous training courses and field activities, including exercises and equipment tests.

For example, a large scale exercise – the 2014 Integrated Field Exercise (IFE) – was conducted in Jordan to test and validate OSI capabilities. The 2014 IFE has brought to light several valuable lessons on OSI capabilities. My personal experience in this IFE, is reflected in this presentation and it constitutes the core aspect of the conclusions.

The ultimate idea of this training process is to be ready to deploy a team of 40 Inspectors anywhere in the world and at any time in order to clarify whether a nuclear weapon test explosion has been carried out in violation of the Comprehensive Nuclear Test Ban Treaty – CTBT -.

According to this Treaty, the Executive Council - the most important policy making organ of the future CTBT Organization – has to approve by only 30 votes out of 51 the On-site Inspection Mandate ( [[1]](#footnote-1) ). Once an OSI has been approved the Inspection Team has just 6 days to be in the ¨site¨ to proceed with the Inspections Activities.

CTBT is the most ¨democratic¨ of all nuclear treaties that exist today. According to articles 34 to 37, any country can challenge another based on scientific information provided by the International Monitory System ([[2]](#footnote-2)) and/or complemented by National Technical Means. A request from an OSI can be originated by any State Member, regardless of their size or the fact that it has a veto in the UN Security Council or not. After a short period of clarifications and consultations in which the Challenging State, the State sought to be inspected and the Director General of the CTBT Organization participates, a decision about an OSI must be taken by the Executive Council. This voting democratic process includes representatives from all Regions: 10 of them will come from Africa, 7 from Eastern Europe, 9 from Latin America, 7 from Middle East and South Asia, 10 from North America and Western Europe and 8 from South-East Asia, the Pacific and the Far East ( [[3]](#footnote-3) ). At this point, we can say without any doubt that the most important decision related to the verification regime of this Treaty is in the hands of its States Members who proceed to vote in equal conditions. In short: ¨your vote counts as much as mine¨.

Upon the arrival of the Inspection team to the Inspected State Point of Entry, the Inspection Mandate is handed over to local authorities in order to start the inspection process promptly. The nature of this kind of Inspections (basically the fact that is a group of foreigners in the territory of a state that has been accused for carried out a nuclear test) will influence the perception of the Inspection Team members by local authorities and nationals, Inspectors will be seeing as ¨intruders¨. Inspector must take this fact into account during the whole duration of an OSI. They have to perform a professional delicate activity and at same time, be aware of what happens around them, ignorance is not an option.

The Treaty defines a zone where Inspections Activities can be performed called ¨Inspection Area¨. This is the only place where inspectors are allowed to do their job ( [[4]](#footnote-4) ). Since that area can reach an extension of 1.000 square kilometers, their first challenge is to reduce it with the help provided by a wide range of different techniques in order to focus ultimately only in certain places (polygons) of high interest for them. Another challenge that Inspector must face is the fact that they have a time frame (maximum of 130 days) to finish their job.

Once in the Inspected State Party (ISP) territory-, the Inspection Team (IT) has to establish and set up a ¨Base of Operations¨. This base will act as a ¨mother ship¨ from where many Team Field Missions are expected to be dispatched and received. After negotiations meetings between both sides (ISP-IT), a set of Field Missions with concrete objectives, specific techniques and defined equipment has to be performed almost every day. The Treaty allows the use of certain inspections techniques from less intrusive ones like Visual Observation, Position Finding and Overflights to the use of more intrusive and complex techniques such Magnetic and Gravitational Field Mapping, Ground Penetrating Radar, Electrical Conductivity and lastly, Drilling.

Less intrusive techniques are known as Initial Period Techniques and can be used extensively from day 1 to day 25 of the OSI and/or eventually till the end of the inspection. A Field Mission can be a mix of two or more techniques. Let’s see how that happens and what kind of result is expected.

While Position Finding helps to confirm the precise boundaries of the Inspection Area and the specific location of interesting sites, an Initial Overflight serves to narrow down the number of locations and identifying sites that need further inspection. An Additional Overflight can also be conducted with the ISP approval and, if so, other activities may be performed at this moment including Multi-Spectral Imagining, Gama Spectroscopy and Magnetic Field Mapping.

Visual Observation can be ground based or in coordination with Overflights. Their aim is to detect anomalies in geological features or disturbances that may point to a possible nuclear explosion. Multi-spectral Imaging may provide information about change in surface, near surface and sub-surface features. Air-borne Gamma Spectroscopy helps identifying gamma radiation coming from man-made activities thus also pointed to a possible nuclear test. Gamma Radiation Monitoring used in vehicle mounted equipment and/or handheld devices, as well as environmental sampling analysis are a very important on-site inspection activities since they may ensure that irradiated elements with short or half-life can still be detected. The main task at this point is to identify as soon as possible the presence of a radionuclide relevant for OSI, means: the smoked gun!

Seismic technology serves to detect the presence of aftershocks that are produced in the cavity formed after an underground nuclear test happens. For this reason, a set of seismic field equipment is placed at several locations through the Inspection Area creating a seismic network for a rapid analysis of seismic data. At this stage, an inspection area has been narrowed down a lot but, but there’s still some work to be done to find the ¨needle in the haystack ¨.

As it has been said, Continuation Techniques – CPT - are more intrusive and will be used in those areas where findings indicate the need for further examination. The use of these geophysical technologies is to detect, from the surface, changes in the geological structure and help identify man-made structures in the ground such as foundations, shafts, pipes and cables (used in nuclear test facilities). This is the case of Magnetic Field Mapping techniques results. On the other hand, Gravitational Field Mapping looks for changes in the density of the rock and locates cavities created by nuclear test. Ground Penetrating radar uses electromagnetic waves to locate objects in the ground and identify parts of an explosion infrastructure as for its side Electrical Conductivity looks for metallic objects that can also belong to the infrastructure of a nuclear test site. Active Seismic Survey, when use, can identify changes and disturbances in the geological structure using artificially created waves to listen their reflections of structures in the ground. Resonances seismometer can also identify cavities.

With the use of the above techniques Inspection Team will be able to locate a potential explosion cavity. When it happens, this ¨cavity¨ needs to be examined further to identify its nuclear nature: there’s nothing to do more but, to ensure that it was a nuclear test, they have to drill that specific area!

Drilling purpose is to obtain samples from the site of the explosion! ( [[5]](#footnote-5) ) This activity can happens only if IT request for it and has been also approved by the Executive Council. Days or even weeks after a nuclear explosion occurs, the cavity material is still contaminated and maybe with high temperatures. Hence, stringent and specifics health and safety precautions are taken. Irradiated samples can be forwarded to laboratories for further analysis.

**WHICH ARE THE MOST IMPORTANT ELEMENTS FOR A DIPLOMATIC SCIENTIFIC BASED DECISION?**

**SAMPLING**

Samples obtained from the field, need to be transfer from the spot to the BOO. At that moment is considered as Inspection Information Collected in the Inspection Area that is transported to the Base of Operations. IT applies measures during the transport of inspection samples to ensure its integrity. Particular measures, are applied for confidential information, or information that has not yet been classified.

Diplomats and political representatives need to know that in order to act confident when an information coming from the field is in front of them (reports). They have to trust that the ¨smoking gun¨ or any other evidence that comes from the IA, has been obtained from the specific place and the correct time, it was protected along the way to the laboratory and was not misused or change by another piece of evidence. This is the reason why the presence of Diplomats in OSI is so important. We are, at a certain point, true witnesses of the whole process and its efficiency.

**CHAIN OF CUSTODY**

During the development of IFE-14 and for the first time it was possible to experience the process of custody of the samples obtained in the field (chain of custody) for which an area of reception of the samples (tent) and a place for their storage (container) and protection were identified. It should be borne in mind that the proper custody of samples is of great importance since it can mean precisely the objective proof of the existence of a Nuclear Test.

**REPORTING**

The most important document of the OSI is the Inspection Report that the IT elaborates in the last phase of the inspection. This document contains a detailed description of the whole OSI process including the activities conducted, cooperation and level of access granted by the Inspected State Authorities, and the factual findings of the Inspection Team. Based on this document the Executive Council has to decide whether any non-compliance with the Treaty has occurred in the Inspected State territory or whether the right to request an OSI has been abused frivolously by the Challenging State.

**CONFIDENTIALITY AND PROTECTION OF INFORMATION**

For Diplomats confidentiality is an important aspect of their common behavior. They need to trust that information, samples and every sensitive aspect of OSI is well protected. This is applied to OSI Limited information and to information which has been classified as OSI Protected and OSI Highly Protected. The procedures are:

Protections that apply to information that has been classified as OSI Protected or OSI Highly Protected are understood as including also the protections that apply to OSI Limited information. Secure areas established for handling of information classified as OSI Protected or OSI Highly Protected. The perimeter of secure areas is protected at least by one barrier to physical access. Moreover, OSI information is stored in locked containers when is not in use. OSI Protected or OSI Highly Protected information, in all its forms, is stored in containers designed to protect against unauthorized access to contents, against damage to contents and against theft of the container. As said, protection applies during transport to the base of operations. Used media, equipment containing data, and samples are held under seal and in the custody of a designated IT member, and of a designated ISP representative if requested. OSI Protected information transmitted is encrypted wherever technically feasible.

**CONCLUSION**

Diplomats and political representatives have to consider that information coming from the field is trustful and scientific based. They need to be sure that the prove is real and is the core element and ¨raison d etre¨ of their decision when voting process is demanded. Diplomats in the field are very important since they are true witnesses of the whole process and its efficiency.

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1. Comprehensive Nuclear Test Ban Treaty, Article IV, Paragraph 46. [↑](#footnote-ref-1)
2. The International Monitoring System (IMS) consists of 321 monitoring stations and 16 laboratories built worldwide. These 337 facilities monitor the planet for any sign of nuclear explosions. [↑](#footnote-ref-2)
3. Comprehensive Nuclear Test Ban Treaty, Annex 1. [↑](#footnote-ref-3)
4. Comprehensive Nuclear Test Ban Treaty, Protocol, Part II, A General Provisions, paragraph 3. [↑](#footnote-ref-4)
5. Comprehensive Nuclear Test Ban Treaty, Protocol, paragraph 69. [↑](#footnote-ref-5)