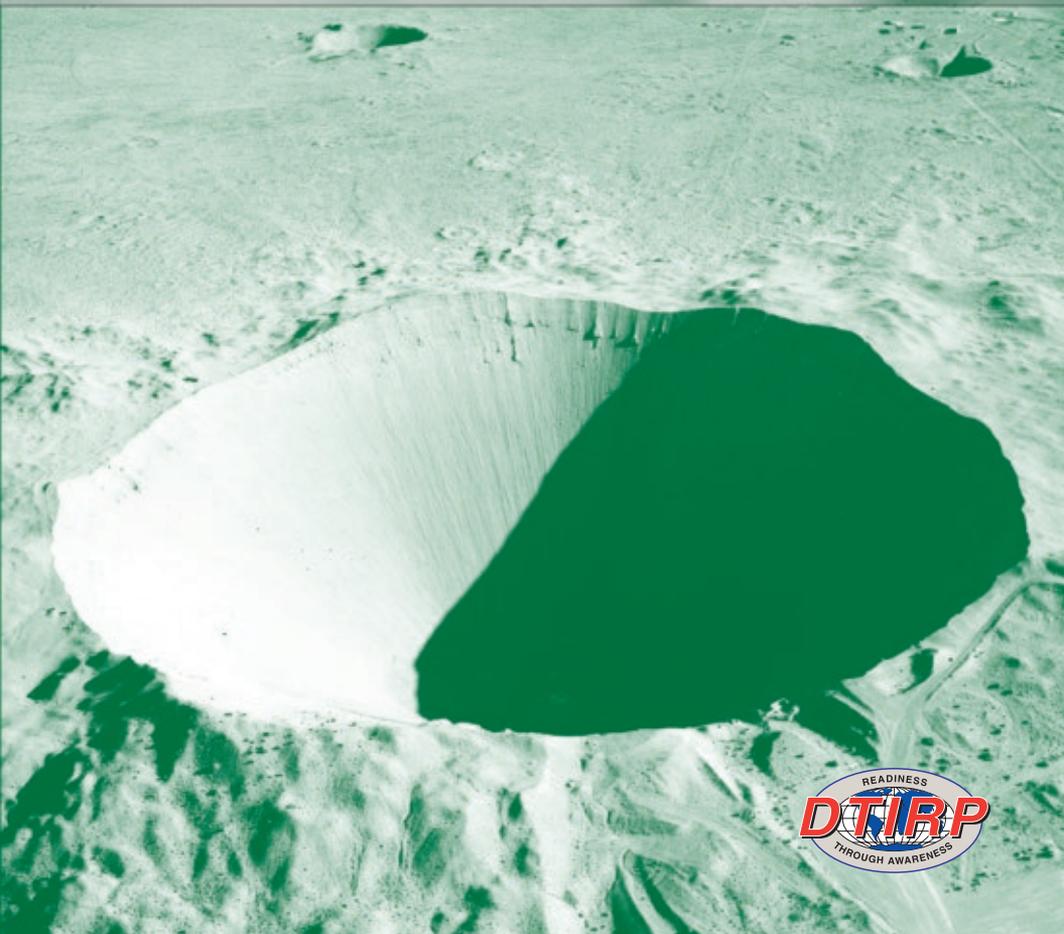


The

IMPACT

COMPREHENSIVE NUCLEAR TEST-BAN TREATY

Order No. 604P • January 2007



This pamphlet was prepared by the Defense Treaty Inspection Readiness Program (DTIRP) to promote **Readiness Through Awareness** at Department of Defense (DoD) and defense contractor facilities potentially impacted by future implementation of the Comprehensive Nuclear Test-Ban Treaty (CTBT).

Additional copies of this pamphlet and other information about arms control security and treaty implementation can be obtained by contacting the DTIRP Outreach Program Coordinator or by downloading products directly from the DTIRP Website (<http://dtirp.dtra.mil>).

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TABLE OF CONTENTS

Introduction	2
Background	3
Verification Measures	5
International Monitoring System	5
Consultations and Clarifications	7
On-Site Inspections.....	8
National Technical Means	14
Confidence-Building Measures	14
Industry Impact	15
Conclusion	17
List of Abbreviations	18
Related Materials	19

INTRODUCTION

This pamphlet is designed to assist facility staff with addressing the potential security challenges associated with implementing the CTBT in the event that it enters into force in the future. The pamphlet describes the Treaty's verification provisions and how on-site inspection activities could impact facility security.



BACKGROUND

The Comprehensive Nuclear Test-Ban Treaty (CTBT) bans all nuclear explosions in all environments and represents the culmination of complex negotiations occurring over several decades. Beginning in the 1950s, Indian Prime Minister Jawaharlal Nehru called for a nuclear test-ban treaty. Subsequently, a number of less comprehensive treaties were agreed, which limited nuclear weapons test explosions.

The Limited Test-Ban Treaty (LTBT) was signed by the United States, the United Kingdom, and the Soviet Union in 1963. This treaty banned nuclear test explosions from occurring in the atmosphere, outer space, and underwater. In 1974 and 1976, the Threshold Test-Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET) were negotiated. These treaties limited the yield from a single nuclear weapon test or from a peaceful nuclear explosion to 150 kilotons. Both treaties were signed by the United States and the Soviet Union. They entered into force in 1990 following the ratification of comprehensive verification protocols.

IMPLEMENTATION STATUS

The CTBT was negotiated in the United Nations (UN) Conference on Disarmament (CD) in Geneva and was opened for signature in the UN General Assembly in September 1996. As of November 2006, 177 states had signed the Treaty and 137 states had ratified it. Signatories include all five acknowledged nuclear weapon states—China, France, Russia, the United Kingdom, and the United States—but the CTBT will not enter into force until 180 days after it has been ratified by the 44 states possessing nuclear power or research reactors. These states are listed in Annex 2 to the CTBT.

Although the United States signed the CTBT on September 24, 1996, it has not ratified the Treaty and the U.S. Senate voted not to ratify the CTBT on October 13, 1999. In January 2002, following the release of the Nuclear Posture Review, the United States determined that it was necessary to upgrade its nuclear testing and research infrastructure to ensure that the United States would be capable of conducting nuclear testing in a relatively short period of time in the event that such testing should be required in the future. However, the United States remains committed to abiding by its voluntary moratorium on nuclear testing.



COMPLIANCE VERIFICATION

The international organization responsible for promoting treaty implementation and for monitoring treaty compliance is the Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO). This organization was established by the Member States and provides a forum where Member States meet, establish working groups, and reach decisions by consensus.

The primary means of verifying compliance with the CTBT is through analyzing the data collected by the global International Monitoring System (IMS). The IMS will provide the international community with a high degree of confidence that any clandestine nuclear weapons explosions will be detected.

When questions arise about possible noncompliance, States Parties will attempt to resolve these concerns through a process of consultations and clarifications. In the event that consultations and clarifications fail to satisfactorily resolve a compliance concern, an on-site inspection may be authorized to resolve specific ambiguities or compliance concerns.

It is possible that a compliance concern could arise from a legitimate man-made or natural seismic event, such as from mining activities or earthquakes. These events could register data similar to the data resulting from a nuclear weapons explosion.

Although no nuclear test explosions have been conducted in the United States since 1992, facilities located near mining activities or natural seismic events could potentially become subject to an on-site inspection. Facility managers and security officers would be obligated to allow an inspection team sent from the CTBTO to have sufficient access to their facility to be able to resolve the compliance concern. At the same time, facility staff would be responsible for protecting national security and proprietary information from inadvertent disclosure, and for maintaining U.S. safety and security standards.

VERIFICATION MEASURES

The verification measures contained in the CTBT are designed to provide a high degree of certainty that clandestine nuclear explosions occurring anywhere in the world will be detected. These measures are designed not only to ensure that States Parties abide by their treaty obligations, they are also relatively cost-effective and non-intrusive except when an on-site inspection is conducted.

This pamphlet describes five types of CTBT verification measures. The first is the global International Monitoring System (IMS), which will be the primary means for verifying compliance. States Parties may also use national technical means (NTM) to identify compliance concerns. When a compliance concern arises, a process of consultations and clarifications can be initiated and, when necessary, an on-site inspection may be conducted to resolve the concern.

The CTBT also encourages States Parties to adopt a number of confidence-building measures. These measures are designed to avoid false alarms potentially resulting from legitimate explosions or naturally occurring events.

INTERNATIONAL MONITORING SYSTEM

The IMS is a global network consisting of 321 monitoring stations and 16 radionuclide laboratories. Although the CTBTO Technical Secretariat has authority over the IMS, all IMS monitoring facilities are owned and operated by the States hosting them. The data collected by these facilities is either input directly into the International Data Center (IDC) or sent to the CTBTO through a National Data Center.

National Data Centers are operated by Member States of the IDC and are capable of analyzing, reporting, and archiving the data received from an IMS monitoring station. When IMS data is sent directly to the IDC, the IDC processes the data and informs the Member States of its analysis. This information enables individual Member States to make judgments about potential compliance concerns. As needed, the IDC will also conduct special studies and provide in-depth technical reviews for Member States. In addition, any National Data Center may obtain a copy of the original IMS data for evaluation.

Each IMF monitoring facility uses one of four specified technologies, which, when used in conjunction with other facilities, provides the data

needed to aid effective international verification of compliance with the CTBT. These technologies are described below:

- **Seismic Monitoring**

Seismic monitoring is central to the CTBT verification regime. An underground nuclear explosion generates seismic waves that move through the earth in the same manner as earthquake-generated seismic waves. One of the few ways of detecting such explosions at a distance from the source is by using seismic monitoring. The IMS includes 50 primary seismic monitoring stations and 120 auxiliary stations located around the world. The primary stations provide the initial capability to detect, locate, and identify underground and most underwater events. The auxiliary stations gather additional data, which will be transmitted only when requested.

- **Radionuclide Monitoring**

The IMS includes 80 radionuclide-monitoring facilities located around the world. These facilities collect air filter samples of radioactive debris particles and measure their gamma-ray spectra with high-efficiency germanium detectors. Careful analysis should be able to detect whether the radionuclides originated from a nuclear explosion. The radionuclide monitoring facilities are also equipped with a gas sampling system for collecting and concentrating atmospheric samples to determine whether argon and xenon radioisotopes, indicative of nuclear explosions, are present.

- **Hydroacoustic Monitoring.**

The IMS uses hydroacoustic monitoring to sense acoustic waves from underwater explosions. Hydroacoustic monitoring may also be able to detect explosions in the lower atmosphere. The hydroacoustic network component consists of six fixed-cable, hydrophone stations and five seismic (T-phase) stations. The relatively small number of facilities will be able to cover large regional areas because of favorable propagation conditions in the Sound Fixing and Ranging (SOFAR) Channel in the world's oceans. Also, sound travels underwater at highly predictable speeds with little acoustic loss (in contrast to sound traveling through air or ground).

- **Infrasound Monitoring**

The IMS infrasound monitoring system uses a network of infrasonic sensors distributed around the world to monitor low-frequency, acoustic signals generated by explosions. It is a primary system for monitoring atmospheric explosions and may be used to monitor shallow, buried events both underground and underwater.

Together, these four monitoring technologies should be able to detect nuclear explosions wherever they occur on earth. If an explosion were conducted on land or underground, the seismic monitoring portion of the IMS should be capable of detecting it. The hydroacoustic system could assist with identifying underground explosions by recording the energy transmitted from the ground to the ocean.

If a nuclear explosion were conducted in the atmosphere, the radionuclide and infrasound monitoring systems should be able to detect it. Finally, if a nuclear explosion were conducted underwater, the hydroacoustic technology should be able to detect it and to assist with locating its origin. The seismic system could also assist with detecting an underwater explosion. Combinations of land-air interface or sea-air interface nuclear explosions could be detected by using a combination of all four technologies.

CONSULTATIONS AND CLARIFICATIONS

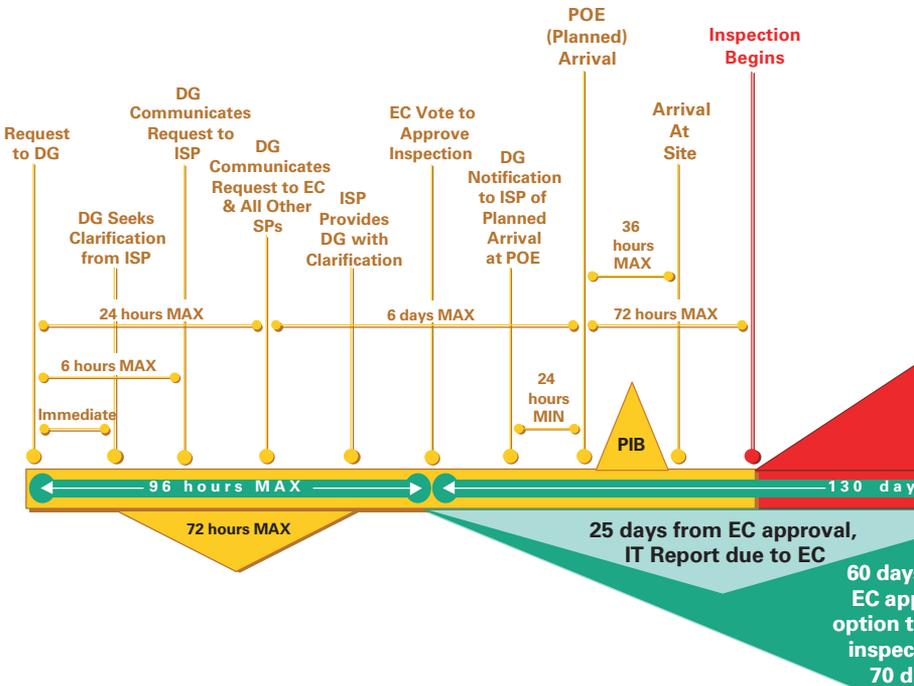
It is expected that most concerns relating to compliance with the CTBT will be resolved through the Treaty's extensive consultation and clarification process. The Treaty encourages States Parties to clarify and resolve compliance concerns among themselves or with the assistance of the CTBTO Executive Council (EC) before requesting an on-site inspection.

When a compliance concern arises, States Parties may ask the EC to request information from other States Parties, as needed, to clarify the concern. A State Party receiving such a request is required to provide sufficient information to the EC to clarify the concern within 48 hours. The EC will record the clarifying information when it is received and forward it to the requesting State Party within 24 hours. If the requesting State Party is not satisfied with the clarification provided, it may ask the EC to obtain additional information.

If the clarifying information remains inadequate, the requesting State Party may ask the EC to review the compliance concern. All States Parties involved in the clarification, whether or not they are members of the EC, may attend the meeting of the EC convened to consider this matter. The States Parties may also recommend measures, including sanctions, to the Conference of States Parties if such measures are determined to be necessary to address a situation found to be out of compliance with the Treaty.

ON-SITE INSPECTIONS

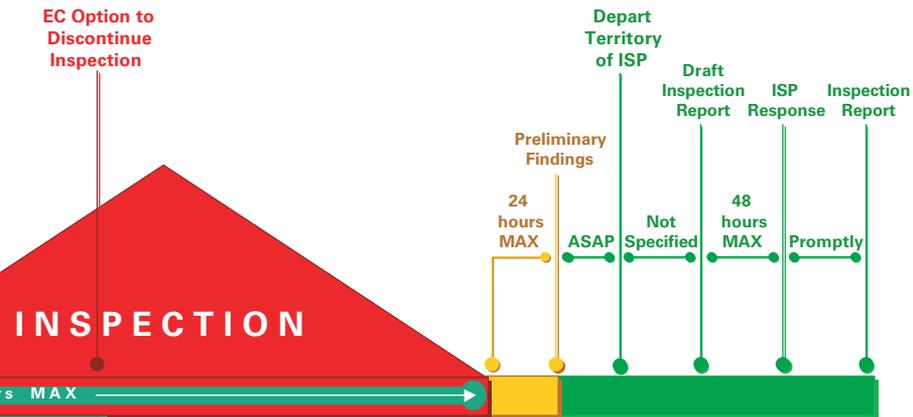
Although the probability of an on-site inspection occurring is low, States Parties will have the right to request on-site inspections when needed to clarify whether a nuclear weapon test or other nuclear explosion has been carried out in violation of the Treaty. Requests for on-site inspections may be based on data obtained from the IMS or from NTM that are consistent with generally recognized principles of international law.



When approved by the EC, a team of inspectors will be sent from the CTBTO to the area where the suspicious event occurred. This area may be continuous or adjoined but can neither exceed 1,000 square kilometers nor be greater than 50 kilometers in any linear distance.

INSPECTION PROCESS

Requests for on-site inspections must be submitted to the Director-General (DG) of the CTBTO. The DG will immediately forward the request to the 51-member EC and the EC will be required to make a decision on the request within 96 hours. While the request is being considered by the EC, the DG will ask the alleged non-compliant State Party to clarify and resolve the concern within 72 hours. If the requesting State Party is satisfied with the clarification provided, it may withdraw its request for an on-site inspection. If the request is not withdrawn, the EC will vote on whether or not to approve the inspection. Thirty affirmative votes are required for approval.



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Once a request for inspection has been approved by the EC, the DG will prepare the inspection mandate. This mandate will include:

- the EC's decision;
- the name of the State Party to be inspected;
- the location and boundaries of the inspection area;
- the planned types of inspection activities to be conducted in the inspection area;
- the point(s) of entry/exit (POE) to be used;
- the names of the members of the inspection team (IT) and the name of the observer to be sent from the requesting State Party; and
- a list of inspection equipment.

The DG will determine the size of the IT (not to exceed 40 members, excluding drilling operations staff) and will select the members of the IT from the lists of eligible inspectors maintained by the CTBTO Technical Secretariat. No nationals from the requesting State Party or from the inspected State Party (ISP) may participate as members of the IT.

The IT will arrive at the ISP's POE no later than 6 days after the initial request for an inspection was received by the EC. At least 24 hours prior to the IT's planned arrival at the POE, the DG will send an official notification to the ISP. This notification will contain:

- the information provided in the inspection mandate;
- the estimated date and time of the IT's arrival;
- the means of the IT's arrival; and
- a list of the equipment the IT would like the ISP to make available for their use.

At the POE, the ISP will conduct a technical inspection of the IT's equipment—in the United States this inspection will be conducted by the Technical Equipment Inspection (TEI) Branch at the Defense Threat Reduction Agency (DTRA). At the POE, the ISP will also present a pre-inspection briefing to the IT—in other arms control agreements this briefing is usually given at the inspection site.

Representatives from the IT and the ISP will meet to review the inspection plan the IT intends to carry out. They will also discuss the accommodations to be provided and any restrictions to be imposed by the ISP. Based on the information presented by the ISP, the IT will have the right to modify its inspection plan.

After required POE activities have been completed, the IT will be transported to the inspection site. The IT must arrive at the inspection site no later than 36 hours after their arrival at the POE and inspection activities must begin no later than 72 hours after arrival at the POE. Consultations between the IT and the ISP may continue at the inspection area as needed to reach a mutual understanding of the inspection activities to be conducted.

The IT will file an interim inspection report no later than 25 days after the EC's approval of the inspection request. Based on this report the EC may decide to terminate the inspection. If not terminated, the inspection may continue for up to 60 days from the date the EC initially approved the inspection. In addition, if required, the EC may extend the inspection for up to an additional 70 days beyond the initial 60-day timeframe.

After inspection activities have been completed, the IT will provide a written report of their preliminary findings to the ISP. These findings will include a list of any samples or other materials taken from the inspection area. The final report of factual findings will be prepared by the DG and will be submitted to the EC and to all States Parties. The EC will consider any compliance concerns and recommend measures, which may include sanctions, to address a situation that contravenes treaty provisions.

CONDUCT OF THE INSPECTION

The ISP and the IT each have certain rights and obligations affecting the on-site inspection activities that may be conducted. The ISP is obligated to allow the IT to conduct those inspection activities that are necessary to fulfill the inspection mandate. The ISP also has the right and the obligation to "make every reasonable effort to demonstrate its compliance."

The ISP's right to protect sensitive information from inadvertent disclosure during on-site inspection activities is of key importance to maintaining facility security. Appropriate protective measures may include:

- recommending modifications, at any time, to the inspection plan;
- having representatives accompany the IT during all inspection activities;
- examining all photographs, measurements, and samples taken during the inspection; and
- retaining any information depicting sensitive sites not related to the purpose of the inspection.

The rights and obligations of the IT include an obligation to refrain from activities that are not relevant to the purpose of the inspection. The IT is also obligated to respect the confidentiality, safety, and health regulations of the ISP.



The IT's rights include the right:

- to determine how the inspection will proceed, as long as the course is consistent with the inspection mandate;
- to request clarifications in connection with ambiguities arising during the inspection; and
- to communicate with each other and with the CTBTO Technical Secretariat at all times during the inspection.

An important limitation on inspection activities is the CTBT's restriction on allowing access to buildings and other structures (other than mine, excavation, or cavern entrances for purposes of transit). Access to buildings and structures can be granted only after the 25-day interim report has been submitted and in the event that the EC has decided not to terminate the inspection. The ISP may then grant access to buildings and structures in accordance with agreed provisions. However, when managing access, the ISP is obligated to make every reasonable effort to satisfy the requirements of the inspection mandate through alternative means.

INSPECTION ACTIVITIES AND TECHNIQUES

The IT has the right to conduct the following activities and to use the following techniques during CTBT inspections:

- confirm the boundaries of the inspection area from the air and from the surface;
- visually search for anomalies above, at, or below the surface using video, still photography, and multispectral imaging (including infrared measurements);
- measure the levels of radioactivity above, at, or below the surface by using gamma radiation analysis;
- take environmental samples and analyze solids, liquids, and gases from above, at, or below the surface;
- use passive seismic monitoring to detect aftershocks, identify the search area, and help to determine the nature of the suspected event;



- take resonance seismometry and active seismic surveys to search for and locate underground anomalies, including cavities and rubble zones;
- take magnetic and gravitational field mapping, ground penetrating radar, and electrical conductivity measurements at the surface and from the air, as appropriate; and
- drill to obtain radioactive samples.

The IT also has the right to conduct overflights of the inspection area. These flights provide a general orientation to the inspection area and allow the IT to see the ground-based inspection area in greater detail. This facilitates the IT's collection of evidence.

Although overflights may be conducted as soon as possible, the total duration of these flights may not exceed 12 hours. In addition, the ISP has the right to impose restrictions on flights over sensitive sites that are not related to the purpose of the inspection

NATIONAL TECHNICAL MEANS

National technical means (NTM), as well as data collected by the IMS, can serve as an acceptable basis for requesting and approving an on-site inspection. According to the Treaty, on-site inspections may be based on "any technical information obtained by national technical means...in a manner consistent with generally recognized principles of international law." Examples of acceptable NTM might include satellite imagery or electromagnetic pulse sensors on satellites.

CONFIDENCE-BUILDING MEASURES

The confidence-building measures under the CTBT are intended to assist the Technical Secretariat with clarifying the origins of large explosions detected by the IMS. States Parties are encouraged to voluntarily notify the Technical Secretariat of chemical explosions using more than 300 metric tons of TNT-equivalent blasting material in a single explosion. When possible, States Parties should provide notification in advance of the explosion and include details such as location, time, and the quantity and type of explosive to be used. Information about the configuration and intended purpose of the blast should also be provided.

INDUSTRY IMPACT

The purpose of the CTBT is to prohibit all future nuclear explosions. Since the United States adopted the voluntary moratorium on nuclear testing in 1992, it is unlikely that a concern about U.S. compliance would arise as the result of an *actual* nuclear test explosion. However, a compliance concern could potentially arise from a false alarm. In that event, after the CTBT enters into force, U.S. Government and commercial facilities, particularly those located in the Southwest near the Nevada Test Site (NTS), could be impacted by an on-site inspection.

False alarms could result from a number of legitimate civilian and commercial activities, or from naturally occurring events, capable of creating seismic readings similar to those generated by a nuclear explosion. For example, a commercial technique known as “ripple-firing” calls for holes to be drilled and filled with explosives. The holes are then fired in a spatial and temporal sequence. Other examples include mine collapses, rock bursts, and coal bumps. Even small-scale





natural earthquakes and the noise from wind and ocean waves originating in the general vicinity of a facility could conceivably prompt further scrutiny under the CTBT.

In the unlikely event that an on-site inspection did occur in the United States, the purpose of the inspection would be to resolve a specific compliance concern. Inspection activities would be limited to those required to fulfill the inspection mandate. However, particularly at facilities in the Southwest, the IT could be very large and could require access to the facility for an extended period of time.

Inspection activities could include collecting environmental samples, taking photographs, creating videos and multispectral images, and using other equipment to collect and analyze data. During these activities, facility staff will be obligated to adequately protect sensitive information from inadvertent disclosure.

Appropriate security countermeasures could include managing the IT's access to areas and information, designating restricted areas, or shrouding sensitive equipment. However, to ensure that the IT is able to successfully resolve the compliance concern, it will also be necessary for facility staff to ensure that the IT is able to carry out all of the activities required to fulfill the inspection mandate.

CONCLUSION

This pamphlet was designed to help facility staff and treaty implementers increase their awareness of the potential security impacts associated with implementing the CTBT. Although the CTBT is not likely to enter into force in the near future, it is important for facility managers and security officers to be aware of the Treaty's purpose and verification provisions.

The pamphlet began with a review of treaty negotiations, the Treaty's current status, and requirements for entering into force. The different means available for verifying treaty compliance were described in some detail, including the circumstances under which a false alarm could create a compliance concern.

For more information about how to determine your facility's susceptibility to on-site inspection activities and how to meet arms control security challenges, contact the DTIRP Outreach Program Coordinator at 1-800-419-2899, or send an email to dtirpoutreach@dtra.mil. You may also contact your local Defense Security Service (DSS) Industrial Security Representative or your government sponsor.

Additional information and training materials can be downloaded directly from the DTIRP website at: <http://dtirp.dtra.mil>.



LIST OF ABBREVIATIONS

CD	Conference on Disarmament
CTBT	Comprehensive Nuclear Test-Ban Treaty
CTBTO	Comprehensive Nuclear Test-Ban Treaty Organization
DG	Director-General (CTBTO)
DSS	Defense Security Service
DTIRP	Defense Treaty Inspection Readiness Program
DTRA	Defense Threat Reduction Agency
EC	Executive Council (CTBTO)
EIF	Entry/entered into force
IDC	International Data Center
IMS	International Monitoring System
ISP	Inspected State Party
IT	Inspection team
LTBT	Limited Test-Ban Treaty
NTM	National technical means
NTS	Nevada Test Site
PNET	Peaceful Nuclear Explosions Treaty
POE	Point of entry/exit
SOFAR	Sound Fixing and Ranging Channel
TEI	Technical Equipment Inspection
TTBT	Threshold Test-Ban Treaty

RELATED MATERIALS

Pamphlets

Comprehensive Nuclear Test-Ban Treaty Indicators (603P)
Quick Reference Guide to Arms Control Inspection Timelines (410P)
Arms Control Agreements Synopses (408P)
DTIRP Arms Control Outreach Catalog (907P)

Videos on CD

Verification Provisions—Point and Counterpoint (936W)
Site Vulnerability Assessments (951W)
Security Countermeasures: Selection and Application (952W)
The Technical Equipment Inspection (TEI) Process (950W)
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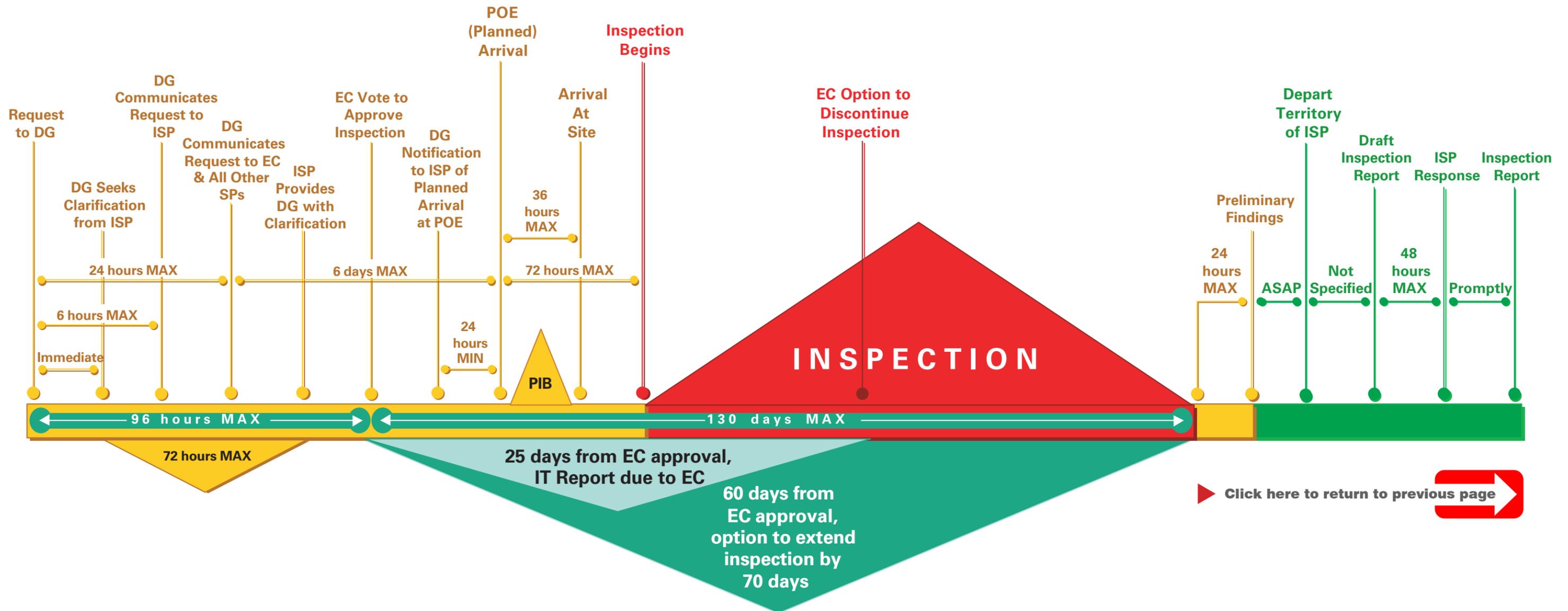
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CTBT Inspection



- 1 The decision to conduct an inspection requires an affirmative vote of 30 members (the Executive Council [EC] is composed of 51 members)
- 2 The inspection shall proceed automatically unless the EC, no later than 24 hours after receipt of the progress inspection report, votes by a majority of all its members not to continue the inspection
- 3 The inspection may be extended beyond 60 days by a maximum of 70 days if the EC, by a simple majority, approves a request by the IT within 72 hours of receipt of such a request
- 4 The IT may request the termination of an inspection at any time; such a request will be considered approved unless the EC, by a 2/3 majority vote, blocks such a request within 72 hours of receipt of the request