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B A C K G R O U N D B R I E F

COMPREHENSIVE NUCLEAR TEST BAN TREATY

"The CTBT is a cornerstone of international efforts to prevent nuclear proliferation. Britain's ratification signals our commitment to the goal of a nuclear weapons free world."

Robin Cook, British Foreign Secretary, 6 April 1998

The ratification by the United Kingdom of the Comprehensive Nuclear Test Ban Treaty (CTBT) is a further step towards achieving a verifiable, permanent, universal ban on all nuclear explosions. Preparations for the verification system are under way, but there are doubts about when the CTBT is likely to enter into force.

This paper has been prepared for general briefing purposes.

COMPREHENSIVE NUCLEAR TEST BAN TREATY

"The Comprehensive Test Ban Treaty is the culmination of almost 40 years of effort involving painstaking negotiations. When the parties to the Non-Proliferation Treaty agreed a set of principles and objectives in 1995, they described a comprehensive test ban treaty as the next step on the road to nuclear disarmament . . . the Treaty will constrain the development and qualitative improvement of nuclear weapons and end the development of advanced new types. That is truly an important step forward."

Tony Lloyd, Minister of State, Foreign and Commonwealth Office, 6 November 1997

On 6 April 1998, Britain and France became the first Nuclear Weapon States to ratify the Comprehensive Nuclear Test Ban Treaty (CTBT), which will prohibit all nuclear explosions throughout the world, for ever. Its permanent monitoring system will be more extensive than that of any other arms control or disarmament treaty in history. The principal components of its verification regime are the **International Monitoring System (IMS)**; the **International Data Centre (IDC)**; and **On-Site Inspections (OSIs)**.

Scope of the Treaty

Under Article 1 of the CTBT, each State Party "undertakes not to carry out any nuclear-weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control". There is no limitation on duration or place: the CTBT provisions extend, to all environments, the existing bans on nuclear test explosions – underwater, in the atmosphere and in space.

Under Article 8, peaceful nuclear explosions could in theory be carried out in future, if consensus to allow this were reached at a Treaty review conference (the first of which is scheduled for 10 years after the CTBT's entry into force), and if the conference could agree the text of an amendment precluding any military benefits. In practice, these conditions are very unlikely to be fulfilled.

International Monitoring System and International Data Centre

Under the IMS, an international network of 321 monitoring stations will continuously measure shock-waves in air, water and rock, and measure atmospheric radioactivity, using one or more of the four relevant technologies [see box]. Each station will transmit data back to the IDC in Vienna, for collation and analysis.

Technologies used by the IMS

Three of the technologies used by the IMS deal directly with the mechanical effects of nuclear explosion:

seismological monitoring measures shock waves through the earth;

hydroacoustic monitoring measures shock waves in water;

infrasound monitoring measures low frequency pressure fluctuations in the atmosphere.

Radionuclide monitoring is the fourth technology used. The detection of certain radioactive products – that is, the fission ones – enables an event to be identified as nuclear in origin. Further analysis of the ratio of specific radionuclides detected, together with a knowledge of their decay processes, enables determination of origin: whether a nuclear explosion; some other event, such as releases from a nuclear reactor; or a natural occurrence. This ability to identify and discriminate has some similarities to fingerprinting.

The four technologies were selected for their technical and cost effectiveness and the synergy between them. Each technology has its own timescale, for instance:

- the time for **wave propagation** depends on distance and the geological structure of the material through which it travels. The observed time usually ranges from some minutes to some hours. As the signal reaches the monitoring station, it is transmitted back to the IDC, almost instantly; and

- the time for **radionuclide detections** is typically days, because radioactive products are carried by the winds (relatively slowly in some parts of the world), and because it then often takes up to three days to collect and measure radioactivity.

The application of all four technologies enables the accurate time and an estimate of the location of the event to be provided after some hours, followed by the nuclear test “fingerprinting” after some days.

The scientific experts who proposed the number, composition and distribution of the monitoring stations judge that the network will be capable of detecting, identifying and locating nuclear explosions anywhere in the world, at least down to a yield of one kiloton (a unit of explosive power equivalent to 1,000 tons of the conventional high explosive trinitrotoluene (TNT)). But, in some parts of the world, the system will be able to detect significantly smaller explosions. Primary seismic stations will transmit data continuously to the IDC, but auxiliary seismic stations will do so on request. The infrasound and hydroacoustic stations will also transmit data continuously. The IDC will thus collect, process, analyse, report on and keep archives of information from the IMS. It will also process analyses from certified laboratories.

On-Site Inspections

Each State Party will have the right to request an OSI on the territory of another State Party, to establish whether a suspect event is a nuclear explosion. A country may base its request either on evidence it has collected itself (using methods, termed “national technical means”, which can include satellite photography), or on evidence from the IMS, or on a combination of the two.

If a request for an OSI is received, the Technical Secretariat* must immediately begin preparations, and the Executive Council* must decide within 96 hours whether or not the OSI will go ahead. Each OSI will be made by a team of experts, selected by the Director-General of the CTBT Organisation* from a list of experts nominated by the States Parties. The inspection team may spend up to 130 days on-site and will produce a report on its findings from the OSI for the Technical Secretariat, for review by the Executive Council. The State inspected will be able to comment.

Entry into force

The CTBT was adopted by the United Nations General Assembly (UNGA) on 10 September 1996 and, by 1 April 1998, had been signed by 149 nations. It will enter into force 180 days after it has been ratified by the 44 States which took part in negotiating the CTBT at the Conference on Disarmament, and which are identified in Annex II of the Treaty as having a nuclear capacity (whether civil or military)**. But at present India shows no willingness to sign or ratify, and Pakistan has declared that her actions are conditional on those of India. If the CTBT has not entered into force three years after the anniversary of its opening for signature on 24 September 1996, and if asked to do so by a majority of States Parties, the Secretary-General of the UN will convene a conference of those States which have ratified the CTBT to consider possible measures to accelerate the ratification process.

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* *For further information, see section on Administration.*

** *See Annex 1.*

Administration

When the CTBT enters into force, the **CTBT Organisation (CTBTO)**, of which all CTBT States Parties will be members, will come into being in Vienna. The CTBTO will consist of:

- a **Conference of the States Parties**, which will normally meet annually;
- an **Executive Council**, consisting of 51 members elected by the Conference on a regional basis* and to be concerned with the routine running of the CTBTO; and
- a **Technical Secretariat**, whose primary function will be to assist the States Parties, the Conference and the Executive Council in implementing the CTBT. It will be responsible for supervising the operation of the IMS, operating the IDC, processing information transmitted to the IDC, and making the processed information available to the States Parties and organs of the CTBTO for analysis. It will also disseminate reports from OSIs.

In addition, the CTBT requires each State Party to set up a **National Authority**, to act as the point of contact with the CTBTO and to be the focal point for the operation of the CTBT within its territory. Britain's National Authority will be in the Ministry of Defence.

Preparations for entry into force

Preparation for the establishment of the CTBTO has started. A Preparatory Commission, or **PrepCom**, started work in New York in November 1996. Since April 1997, it has been operating in Vienna.

The CTBT PrepCom has designated a task force of scientific experts to establish the IMS. Thanks to experiments carried out by the Conference on Disarmament (see below) since the 1970s, some 60 per cent of the primary seismic stations already exist, but not all to the required standard. Many will need upgrading. Similarly, the auxiliary seismic network, although much of it already exists, will need substantial upgrading. The other three networks need to be established almost from scratch.

***The six regional groups of the CTBT will be: Africa; Eastern Europe; Latin America and the Caribbean; the Middle East and South Asia; South-East Asia, the Pacific and the Far East; and North America and Western Europe. Each regional group will allocate at least one-third of its seats to States in its region according to criteria such as a State's nuclear capability; its security interests; and the number of CTBT monitoring facilities located on its territory.*

The **Provisional Technical Secretariat** is already established in Vienna. It is housed in the same building complex as the International Atomic Energy Agency (IAEA), where the CTBTO will have its headquarters.

History of negotiations

An *ad hoc* committee of the Conference on Disarmament in Geneva (an autonomous negotiating body and the only standing multilateral disarmament negotiating forum) started to negotiate the text for a CTBT in January 1994. Work proceeded slowly, partly because of a divergence of approach between the Nuclear Weapon States (Britain, China, France, Russia and the United States), which saw a CTBT as primarily a non-proliferation measure, and various Non-Nuclear Weapon States, which saw it as primarily a disarmament measure. But the 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) gave impetus to the process: at the same time as deciding to extend the NPT indefinitely, NPT Parties made a commitment to complete negotiation of the CTBT “no later than 1996”.

Non-Nuclear Weapon States are effectively prevented from testing nuclear weapons by virtue of their status under the NPT. But there are three “nuclear capable” countries – India, Israel and Pakistan (commonly known as the “Threshold States”) – which are not Parties to the NPT. Of the eight States which could potentially test (the five Nuclear Weapon States and the three Threshold States), seven were prepared to accept that ratification of the CTBT by the eight should be a requirement for its entry into force. But India reacted strongly against this formulation.

A revised text prepared by the committee Chairman, Ambassador Jaap Ramaker of the Netherlands, on 14 August 1996, was acceptable to an overwhelming majority of delegations, and Australia tabled it at the UNGA the following month. It was adopted on 10 September 1996, with 158 votes in favour. There were five abstentions (Cuba, Lebanon, Mauritius, Syria and Tanzania) and three votes against (Bhutan, India and Libya).

British perspectives

Britain strongly supports the CTBT and hopes that problems over adherence to it by key States – including India and Pakistan, who have so far refused to sign – can be overcome. But even before the Treaty’s entry into force, the CTBT process makes nuclear testing unlikely for the following reasons:

- it establishes an international political norm against testing; and
- it will provide, through the IMS, more information about suspected tests.

Additional value is provided by the supplementary uses to which IMS data can be put. Infrasound monitoring, for example, can detect and locate volcanic eruptions, thus providing warning for aircraft of ashclouds. At the same time, measurement of atmospheric radioactivity aids environmental monitoring for health and safety purposes.

Britain's national research programme, established in the early 1960s, to study means of detecting and verifying nuclear explosions, enabled her to play a major role in the negotiations on the CTBT verification system. It continues to enable her to make a significant contribution to current efforts in Vienna to achieve the Treaty's entry into force. Britain will retain a national capability to allow her to reach an independent judgement on the data produced by the IMS. Once the Treaty enters into force, this will strengthen her ability to justify any request, if needed, for an OSI to investigate a suspicious event.

Once the CTBT is in force, Britain will have to underwrite the continuing safety of her Trident warheads without the benefit of nuclear testing, relying on methods that do not involve a nuclear explosion.

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ANNEX 1

List of countries party to the CTBT negotiations identified by the International Atomic Energy Agency as having a nuclear capacity

1. Algeria
2. Argentina
3. Australia
4. Austria
5. Bangladesh
6. Belgium
7. Brazil
8. Bulgaria
9. Canada
10. Chile
11. China
12. Colombia
13. Democratic People's Republic of Korea
14. Democratic Republic of the Congo
15. Egypt
16. Finland
17. France
18. Germany
19. Hungary
20. India
21. Indonesia
22. Iran
23. Israel
24. Italy
25. Japan
26. Mexico
27. Netherlands
28. Norway
29. Pakistan
30. Peru
31. Poland
32. Romania
33. Republic of Korea
34. Russian Federation
35. Slovakia
36. South Africa
37. Spain
38. Sweden
39. Switzerland
40. Turkey
41. Ukraine
42. United Kingdom
43. United States of America
44. Vietnam

ANNEX 2

Monitoring stations in the United Kingdom and Dependencies

TYPE	LOCATION
Seismological (array) station: (Auxiliary network)*	Eskdalemuir, Scotland
Radionuclide stations:	British Indian Ocean Territory (BIOT)/Chagos Archipelago (Diego Garcia)
	St Helena
	Halley, Antarctica
	Tristan da Cunha
Hydroacoustic stations:	BIOT/Chagos Archipelago (Diego Garcia)
	Tristan da Cunha
	Ascension Island**
Infrasound stations:	Tristan da Cunha
	Ascension Island
	Bermuda
	BIOT/Chagos Archipelago (Diego Garcia)

The two categories of seismological station are three component (3-C) or array. An array is a system of two or more locations (mainly boreholes) containing seismic measuring instrumentation in some geometric arrangement. Because of their better signal-to-noise ratio, array stations are able to offer better detection and source location than 3-C stations.

***The USA is responsible for this station.*