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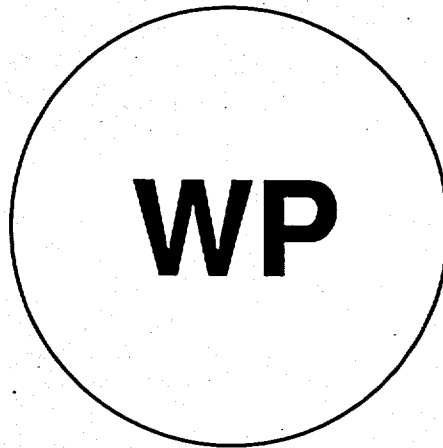
CONFERENCE ON DISARMAMENT

NUCLEAR TEST BAN

COMPREHENSIVE NUCLEAR TEST BAN TREATY (CTBT)

WORKING PAPERS (WP)

1990-93 SESSIONS



COMPILED AND EDITED BY:

NON-PROLIFERATION, ARMS CONTROL AND DISARMAMENT DIVISION OF THE
DEPARTMENT OF FOREIGN AFFAIRS AND INTERNATIONAL TRADE
OTTAWA, CANADA



JANUARY 1994

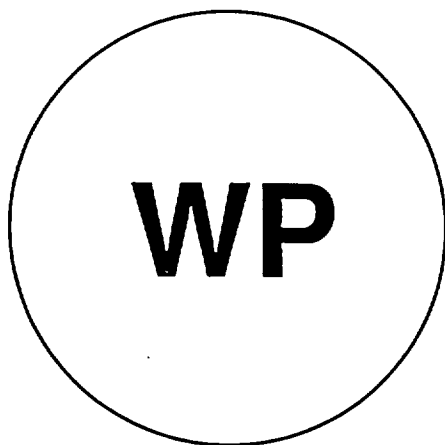
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WORKING PAPERS (WP)

PREFACE

This volume covers working papers relating to a Nuclear Test Ban submitted in plenary to the Conference on Disarmament during its 1990-1993 sessions. It is compiled to facilitate research and discussions on this issue.

Note that the index is a chronological listing while the documents themselves are arranged in numerical order by CD number.

NUCLEAR TEST BAN
Comprehensive Nuclear Test Ban Treaty (CTBT)

Working Papers
Submitted to the Conference on Disarmament

1990-1993

Chronological Index

Serial	Reference	Country	Description	Date
<u>1990</u>				
198	CD/959 [EXTRACT]	UN Sec- retary- General	Letter dated 26 January 1990 from the Secretary-General of the United Nations addressed to the President of the Conference on Disarmament transmitting the resolutions and decisions on disarmament adopted by the General Assembly at its forty-fourth session	31.1.90
199	CD/981	AHGSE	Progress Report to the Conference on Disarmament on the twenty-ninth session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	30.3.90
200	CD/1010	Norway	Verification of a comprehensive nuclear test ban: Report on the Workshop on Seismological Aspects of Nuclear Test Ban Verification in Oslo, Norway, 14-17 February 1990	26.6.90
201	CD/1016	CD	Mandate for an <u>Ad Hoc</u> Committee under Agenda Item 1: "Nuclear Test Ban"	17.7.90

Serial	Reference	Country	Description	Date
202	CD/1032	AHGSE	Progress report to the Conference on Disarmament on the thirtieth session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	10.8.90
203	CD/1035	AHCNTB	Report of the <u>Ad Hoc</u> Committee on a Nuclear Test Ban	20.8.90
<u>1991</u>				
204	CD/1045 [EXTRACT]	UN Secretary-General	Letter dated 14 January 1991 from the Secretary-General of the United Nations to the President of the Conference on Disarmament transmitting the resolutions and decisions on disarmament adopted by the General Assembly at its forty-fifth session	17.1.91
205	CD/1054	Indonesia, Mexico, Peru, Venezuela, Yugoslavia and Sri Lanka	Letter dated 4 February 1991 from the Representatives of Indonesia, Mexico, Peru, Venezuela, Yugoslavia and Sri Lanka addressed to the President of the Conference on Disarmament transmitting Draft Protocol II of Amendment to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water	4.2.91
206	CD/1060	CD	Mandate for an <u>Ad Hoc</u> Committee under Agenda Item 1: "Nuclear Test Ban"	14.2.91

Serial	Reference	Country	Description	Date
207	CD/1065	CD	Progress report to the Conference on Disarmament on the thirty-first session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	22.2.91
208	CD/1066	USA	Letter dated 28 February 1991 from the Representative of the United States of America addressed to the President of the Conference on Disarmament transmitting the text of the 1974 Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, together with its Protocol	8.3.91
209	CD/1067	USA	Letter dated 28 February 1991 from the Representative of the United States of America addressed to the President of the Conference on Disarmament transmitting the text of the 1976 Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Explosions for Peaceful Purposes, together with its Protocol	8.3.91

Serial	Reference	Country	Description	Date
210	CD/1068	USSR	Letter dated 28 February 1991 from the Representative of the Union of Soviet Socialist Republics addressed to the President of the Conference on Disarmament transmitting the text of the 1974 Treaty between the Union of Soviet Socialist Republics and the United States of America on the Limitation of Underground Nuclear Weapon Tests, together with the Protocol thereto	8.3.91
211	CD/1069	USSR	Letter dated 28 February 1991 from the Representative of the Union of Soviet Socialist Republics addressed to the President of the Conference on Disarmament transmitting the text of the 1976 Treaty between the Union of Soviet Socialist Republics and the United States of America on the Limitation of Underground Nuclear Explosions for Peaceful Purposes, together with the Protocol thereto	8.3.91
212	CD/1081 CD/NTB/ WP.13	Australia and New Zealand	Verification of a comprehensive test ban	11.6.91
213	CD/1089 CD/NTB/ WP.14	Sweden	Letter dated 9 July 1991 from the Head of the Swedish Delegation addressed to the Secretary-General of the Conference on Disarmament transmitting the text of a draft comprehensive test ban treaty and its annexed protocols	25.7.91

Serial	Reference	Country	Description	Date
214	CD/1094	Canada	Letter dated 2 August 1991 from the Permanent Representative of Canada addressed to the Secretary-General of the Conference on Disarmament transmitting the Arms Control Verification Occasional Paper No.8, entitled "Nuclear Test Ban Verification: Recent Canadian Research in Forensic Seismology"	7.8.91
215	CD/1097	AHGSE	Progress Report to the Conference on Disarmament on the thirty-second session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	9.8.91
216	CD/1106 and Corr.1	CD	Report of the <u>Ad Hoc</u> Committee on a Nuclear Test Ban	23.8.91
217	A/RES/46/28	UNGA	Resolution adopted by the General Assembly (during its forty-sixth session)	20.12.91
218	A/RES/46/29	UNGA	Resolution adopted by the General Assembly (during its forty-sixth session)	27.12.91
<u>1992</u>				
219	CD/1144	AHGSE	Sixth Report to the Conference on Disarmament of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	13.3.92

Serial	Reference	Country	Description	Date
220	CD/1145	AHGSE	Progress report to the Conference on Disarmament on the thirty-third session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	13.3.92
221	CD/1151	Norway	Letter dated 29 May 1992 from the Representative of Norway addressed to the Secretary-General of the Conference on Disarmament transmitting a summary of a study on a comprehensive test-ban treaty	1.6.92
222	CD/1163 and Corr.1	AHGSE	Progress report to the Conference on Disarmament on the thirty-fourth session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international co-operative measures to detect and identify seismic events	7.8.92
223	CD/1167	Norway	Letter dated 12 August 1992 from the Representative of Norway addressed to the Secretary-General of the Conference on Disarmament transmitting a report of the Expert Study on Questions Related to a Comprehensive Test Ban Treaty	14.8.92
224	CD/1173 [EXTRACT]	CD	Report of the Conference on Disarmament to the General Assembly of the United Nations	3.9.92

Serial	Reference	Country	Description	Date
<u>1993</u>				
225	CD/1177 [EXTRACT]	UN Secretary-General	Letter dated 29 December 1992 from the Secretary-General of the United Nations addressed to the President of the Conference on Disarmament transmitting the resolutions and decisions on disarmament adopted by the General Assembly at its forty-seventh session	14.1.93
226	CD/1179	CD	Mandate for an <u>Ad Hoc</u> Committee under agenda item 1: "Nuclear Test Ban"	22.1.93
227	CD/1199 CD/NTB/ WP.16	Canada	Letter dated 26 May 1993 from the Permanent Representative of Canada addressed to the Secretary-General of the Conference on Disarmament transmitting a booklet entitled "Non-Seismic Technologies in Support of a Nuclear Test Ban"	26.5.93
228	CD/1201 CD/NTB/ WP.18	Canada	Letter dated 3 June 1993 from the Permanent Representative of Canada addressed to the Secretary-General of the Conference on Disarmament transmitting a booklet entitled "Constraining Proliferation: The Contribution of Verification Synergies"	3.6.93
229	CD/1200/ Rev.1	Group of 21	Group of 21: Draft statement	11.6.93

Serial	Reference	Country	Description	Date
230	CD/1202 CD/NTB/ WP.19	Sweden	Letter dated 3 June 1993 from the Head of the Swedish Delegation addressed to the Secretary-General of the Conference on Disarmament transmitting the text of a draft comprehensive test-ban treaty	3.6.93
231	CD/1204	Mexico	Letter dated 17 June 1993 from the Permanent Representative of Mexico addressed to the Secretary-General of the Conference on Disarmament transmitting a copy of a letter on nuclear testing sent to the President of the United States on 14 June 1993 by the members of the Pugwash Council attending the 43rd Pugwash Conference in Hasseludden, Sweden	17.6.93
232	CD/1205 CD/NTB/ WP.24	USA	Letter dated 20 July 1993 from the Representative of the United States of America addressed to the President of the Conference on Disarmament transmitting a document containing the text of President Clinton's Radio Address of July 2, 1993, regarding his decision on U.S. nuclear testing policy	20.7.93

Serial	Reference	Country	Description	Date
233	CD/1208	Venezuela	Letter dated 22 July 1993 from the Permanent Representative of Venezuela addressed to the Secretary-General of the Conference on Disarmament transmitting the text of a communique issued by his government in connection with the extension of the existing moratorium on nuclear testing	27.7.93
234	CD/1209	Australia, Mexico and Nigeria	Draft decision	3.8.93
235	CD/1210	Indonesia	Letter dated 4 August 1993 from the Permanent Representative of Indonesia addressed to the Secretary-General of the Conference on Disarmament transmitting a message from Mr. Ali Alatas, Minister for Foreign Affairs of Indonesia and President of the Amendment Conference of States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water on the occasion of the 30th anniversary of the signing of the Treaty	4.8.93
236	CD/1211	AHGSE	Progress report to the Conference on Disarmament on the thirty-sixth session of the <u>Ad Hoc</u> Group of Scientific Experts to consider international cooperative measures to detect and identify seismic events	10.8.93

Serial	Reference	Country	Description	Date
237	CD/1212	CD	Decision on agenda item 1 "Nuclear Test Ban" adopted by the Conference on Disarmament at its 659th plenary meeting on 10 August 1993	10.8.93
238	CD/1220	AHCNTB	Report of the <u>Ad Hoc</u> Committee on a Nuclear Test Ban	24.8.93
239	CD/1227	Chile	Letter dated 11 October 1993 from the Permanent Representative of Chile addressed to the Secretary-General of the Conference on Disarmament transmitting a statement by the government of Chile concerning the nuclear test carried out by China	13.10.93
240	CD/1231	Mexico	Letter dated 29 November from the Permanent Representative of Mexico addressed to the President of the Conference on Disarmament transmitting the text of a working paper of the Group of 21 entitled "Conclusion of a Comprehensive Nuclear-Test Ban Treaty"	1.12.93
241	CD/1232 CD/NTB/ WP.33	Sweden	Letter dated 6 December 1993 from the Head of the Delegation of Sweden addressed to the Secretary-General of the Conference on Disarmament transmitting the text of a draft comprehensive nuclear test ban treaty and its annexed draft protocol	6.12.93

1990

CONFERENCE ON DISARMAMENT

CD/959
31 January 1990

Original: ENGLISH

(EXTRACT)

LETTER DATED 26 JANUARY 1990 FROM THE SECRETARY-GENERAL OF THE UNITED NATIONS
ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE
RESOLUTIONS AND DECISIONS ON DISARMAMENT ADOPTED BY THE GENERAL ASSEMBLY
AT ITS FORTY-FOURTH SESSION

I have the honour to transmit herewith the texts of the resolutions adopted by the General Assembly at its forty-fourth session, which entrust specific responsibilities to the Conference on Disarmament in 1990. The relevant provisions of those resolutions are reproduced in the Annex.

For the information of the Conference, you will also find attached the texts of other resolutions and decisions, dealing with or related to disarmament matters, which were adopted by the General Assembly at its forty-fourth session.

(Signed) Javier Pérez de Cuéllar

The Conference's attention should be drawn, in particular, to the following provisions contained in those resolutions:

(1) In resolution 44/105, operative paragraph 5 appeals to all States members of the Conference on Disarmament to promote the establishment by the Conference at the beginning of its 1990 session of an ad hoc committee with the objective of carrying out the multilateral negotiation of a treaty on the complete cessation of nuclear-test explosions; and operative paragraph 6 recommends to the Conference on Disarmament that such an ad hoc committee should comprise two working groups dealing, respectively, with the following interrelated questions: contents and scope of the treaty, and compliance and verification.

(2) In resolution 44/107, operative paragraph 2 urges that the following actions be taken in order that a comprehensive nuclear-test-ban treaty may be concluded at an early date: (a) The Conference on Disarmament should intensify its consideration of item 1 of its agenda entitled "Nuclear-test ban" and initiate substantive work on all aspects of a nuclear-test-ban treaty at the beginning of its 1990 session; (b) States members of the Conference on Disarmament, in particular the nuclear-weapon States, and all other States should co-operate in order to facilitate and promote such work; (c) The nuclear-weapon States, especially those which possess the most important nuclear arsenals, should agree promptly to appropriate verifiable and militarily significant interim measures, with a view to realizing a comprehensive nuclear-test-ban treaty; (d) Those nuclear-weapon States that have not yet done so should adhere to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water; operative paragraph 3 also urges the Conference on Disarmament: (a) To take immediate steps for the establishment, with the widest possible participation, of an international seismic monitoring network with a view to the further development of its potential to monitor and verify compliance with a comprehensive nuclear-test-ban treaty; (b) To take into account, in this context, the progress achieved by the Ad hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, including work on the routine exchange and use of wave-form data, and other relevant initiatives or experiments by individual States and groups of States; (c) To encourage the widest possible participation by States in the technical test that will take place in 1990 concerning the global exchange and analysis of seismic data; (d) To initiate detailed investigation of other measures to monitor and verify compliance with such a treaty, including an international network to monitor atmospheric radioactivity; and operative paragraph 4 calls upon the Conference on Disarmament to report to the General Assembly at its forty-fifth session on progress made.



General Assembly

Distr.
GENERAL

A/RES/44/105
8 January 1990

Forty-fourth session
Agenda item 50

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[(on the report of the First Committee (A/44/772)]

44/105. Cessation of all nuclear-test explosions

The General Assembly,

Bearing in mind that the complete cessation of nuclear-weapon tests, which has been examined for more than thirty years and on which the General Assembly has adopted more than fifty resolutions, is a basic objective of the United Nations in the sphere of disarmament, to the attainment of which it has repeatedly assigned the highest priority,

Stressing that on eight different occasions it has condemned such tests in the strongest terms and that, since 1974, it has stated its conviction that the continuance of nuclear-weapon testing will intensify the arms race, thus increasing the danger of nuclear war,

Recalling that the Secretary-General, addressing a plenary meeting of the General Assembly on 12 December 1984, after appealing for a renewed effort towards a comprehensive test-ban treaty, emphasized that no single multilateral agreement could have a greater effect on limiting the further refinement of nuclear weapons and that a comprehensive test-ban treaty is the litmus test of the real willingness to pursue nuclear disarmament, 1/

1/ See Official Records of the General Assembly, Thirty-ninth Session, Plenary Meetings, 97th meeting, para. 302.

Taking into account that the three nuclear-weapon States that act as depositaries of the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water 2/ undertook in article I of that Treaty to conclude a treaty resulting in the permanent banning of all nuclear-test explosions, including all those explosions underground, and that such an undertaking was reiterated in 1968 in the preamble to the Treaty on the Non-Proliferation of Nuclear Weapons, 3/ article VI of which further embodies their solemn and legally binding commitment to take effective measures relating to cessation of the nuclear-arms race at an early date and to nuclear disarmament,

Noting that the Third Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, in its Final Declaration 4/ adopted on 21 September 1985, called upon the nuclear-weapon States parties to the Treaty to resume trilateral negotiations in 1985 and upon all the nuclear-weapon States to participate in the urgent negotiation and conclusion of a comprehensive nuclear-test-ban treaty, as a matter of the highest priority, in the Conference on Disarmament,

Recalling the disarmament document adopted by the Ninth Conference of Heads of State or Government of Non-Aligned Countries, held at Belgrade from 4 to 7 September 1989, which underlined that the immediate suspension of and comprehensive ban on nuclear tests remained one of the highest priorities of nuclear disarmament, 5/

Recalling also that the leaders of the States associated with the Six-Nation Initiative on peace and disarmament affirmed in the Stockholm Declaration, 6/ adopted on 21 January 1988, that "Any agreement that leaves room for continued testing would not be acceptable",

Taking note with satisfaction of the continuing progress made in the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events on the seismic verification of a comprehensive test ban, 7/

2/ United Nations, Treaty Series, vol. 480, No. 6964.

3/ Ibid., vol. 729, No. 10485.

4/ Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Final Document, Part I (NPT/CONF.III/64/I) (Geneva, 1985), annex I.

5/ See A/44/551-S/20870, annex, p. 22, para. 10.

6/ A/43/125-S/19478, annex.

7/ See Official Records of the General Assembly, Forty-fourth Session, Supplement No. 27 (A/44/27), para. 29.

Expressing its concern that, after six years of efforts, the Conference on Disarmament has not yet succeeded in establishing an ad hoc committee on item 1 of its agenda, entitled "Nuclear test ban",

1. Reiterates once again its grave concern that nuclear-weapon testing continues unabated, against the wishes of the overwhelming majority of Member States;

2. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States for all time is a matter of the highest priority;

3. Reaffirms also its conviction that such a treaty would constitute a contribution of the utmost importance to the cessation of the nuclear-arms race;

4. Urges once more all nuclear-weapon States, in particular the three depositary Powers of the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water and of the Treaty on the Non-Proliferation of Nuclear Weapons, to seek to achieve the early discontinuance of all test explosions of nuclear weapons for all time and to expedite negotiations to this end;

5. Appeals to all States members of the Conference on Disarmament to promote the establishment by the Conference at the beginning of its 1990 session of an ad hoc committee with the objective of carrying out the multilateral negotiation of a treaty on the complete cessation of nuclear-test explosions;

6. Recommends to the Conference on Disarmament that such an ad hoc committee should comprise two working groups dealing, respectively, with the following interrelated questions: contents and scope of the treaty, and compliance and verification;

7. Decides to include in the provisional agenda of its forty-fifth session the item entitled "Cessation of all nuclear-test explosions".

81st plenary meeting
15 December 1989



General Assembly

Distr.
GENERAL

A/RES/44/106
12 January 1990

Forty-fourth session
Agenda item 51

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/44/773)]

44/106. Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water

The General Assembly,

Reiterating its conviction that a comprehensive nuclear-test-ban treaty is the highest-priority step towards nuclear disarmament,

Recalling its resolution 1910 (XVIII) of 27 November 1963, in which it noted with approval the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, 1/ signed on 5 August 1963, and requested the Conference of the Eighteen-Nation Committee on Disarmament 2/ to continue with a sense of urgency its negotiations to achieve the objectives set forth in the preamble to the Treaty,

Convinced that, pending the conclusion of a comprehensive nuclear-test-ban treaty, the nuclear-weapon States should suspend all nuclear-test explosions through an agreed moratorium or unilateral moratoria,

Noting that article II of the Treaty provides a procedure for convening a conference of the parties to the Treaty to consider amendments to the Treaty,

Noting also that, in its resolution 42/26 B of 30 November 1987, it recommended that the non-nuclear-weapon States parties to the Treaty formally submit an amendment proposal to the Depositary Governments with a view to convening

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ The Committee on Disarmament was redesignated the Conference on Disarmament as from 7 February 1984.

a conference at the earliest possible date to consider amendments to the Treaty that would convert it into a comprehensive nuclear-test-ban treaty and that, by its resolution 43/63 B of 7 December 1988, it welcomed the submission of such an amendment proposal,

Noting further that the Ninth Conference of Heads of State or Government of Non-Aligned Countries, held at Belgrade from 4 to 7 September 1989, supported the initiative to convene, as soon as possible in 1990, an amendment conference to convert the Treaty into a comprehensive nuclear-test-ban treaty, ^{3/}

Considering that more than one third of the parties have requested the convening of a conference to consider such an amendment, and that Depositary Governments have announced their intention to comply with their obligations under the Treaty,

Convinced that such a conference will serve to strengthen the Treaty,

1. Recommends that a preparatory committee, open to all parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, should be established to make arrangements for the amendment conference and that such preparatory committee should meet at United Nations Headquarters from 29 May to 1 June 1990, followed by a one-week session of the conference from 4 to 8 June 1990 and a second substantive session from 7 to 18 January 1991;
2. Recommends also that the costs of the amendment conference and its preparatory committee should be shared among the States parties to the Treaty, on the basis of the present scale of assessments of the United Nations;
3. Requests the Secretary-General to render the necessary assistance and provide such services, including summary records, as may be required for the amendment conference and its preparation;
4. Invites the amendment conference to transmit to the General Assembly the documents it deems appropriate to keep the Assembly duly informed of its ongoing work;
5. Decides to include in the provisional agenda of its forty-fifth session the item entitled "Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water".

81st plenary meeting
15 December 1989

^{3/} See A/44/551-S/20870, annex, p. 22, para. 10.



General Assembly

Distr.
GENERAL

A/RES/44/107
16 January 1990

Forty-fourth session
Agenda item 52

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/44/774)]

44/107. Urgent need for a comprehensive nuclear-test-ban treaty

The General Assembly,

Convinced that a nuclear war cannot be won and must never be fought,

Convinced also of the consequent urgent need for an end to the nuclear-arms race and the immediate and verifiable reduction and ultimate elimination of nuclear weapons,

Convinced further that an end to nuclear testing by all States in all environments for all time is an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation and to contribute, along with other concurrent efforts to reduce nuclear arms, to the eventual elimination of nuclear weapons,

Recognizing the recent progress made in the negotiations between the Union of Soviet Socialist Republics and the United States of America, as reflected in their joint statement of 23 September 1989, 1/ towards improved verification arrangements and the ratification of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapons Tests, 2/ signed on 3 July 1974, and the Treaty between the United States

1/ A/44/578-S/20868, annex.

2/ Official Records of the General Assembly, Twenty-ninth Session, Supplement No. 27 (A/9627), annex II, document CCD/431.

of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, 3/ signed on 28 May 1976, and urging both countries to complete that process,

Welcoming the ongoing implementation of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles 4/ and the agreement in principle on and further progress made towards an agreement for 50 per cent reductions in their strategic nuclear forces,

Recalling the disarmament document adopted by the Ninth Conference of Heads of State or Government of Non-Aligned Countries, held at Belgrade from 4 to 7 September 1989, 5/

Recalling also the proposals by the leaders of the Six-Nation Initiative to promote an end to nuclear testing, 6/

Convinced that the most effective way to achieve the discontinuance of all nuclear tests by all States in all environments for all time is through the conclusion, at an early date, of a verifiable, comprehensive nuclear-test-ban treaty that will attract the adherence of all States,

Reaffirming the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty,

Taking note of the work being undertaken within the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Co-operative

3/ The United Nations Disarmament Yearbook, vol. I: 1976 (United Nations publication, Sales No. E.77.IX.2), appendix III.

4/ Ibid., vol. 12: 1987 (United Nations publication, Sales No. E.88.IX.2), appendix VII.

5/ A/44/551-S/20870, annex, pp. 20-25.

6/ See the Joint Declaration issued on 22 May 1984 by the heads of State or Government of Argentina, Greece, India, Mexico, Sweden and the United Republic of Tanzania (A/39/277-S/16587, annex; for the printed text, see Official Records of the Security Council, Thirty-ninth Year, Supplement for April, May and June 1984, document S/16587, annex), reaffirmed in the Delhi Declaration issued on 28 January 1985 (A/40/114-S/16921, annex; for the printed text, see Official Records of the Security Council, Fortieth Year, Supplement for January, February and March 1985, document S/16921, annex), the Mexico Declaration issued on 7 August 1986 (A/41/518-S/18277, annex I), the Stockholm Declaration issued on 21 January 1988 (A/43/125-S/19478, annex) and the Declaration issued on 22 May 1989 on the occasion of the fifth anniversary of the launching of the Six-Nation Initiative (A/44/318-S/20689, annex).

Measures to Detect and Identify Seismic Events in preparation for the next phase of the technical test, to take place in 1990, concerning the global exchange and analysis of seismic data, 7/

1. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States in all environments for all time is a matter of fundamental importance;

2. Urges, therefore, that the following actions be taken in order that a comprehensive nuclear-test-ban treaty may be concluded at an early date:

(a) The Conference on Disarmament should intensify its consideration of item 1 of its agenda, entitled "Nuclear test ban", and initiate substantive work on all aspects of a nuclear-test-ban treaty at the beginning of its 1990 session;

(b) States members of the Conference on Disarmament, in particular the nuclear-weapon States, and all other States should co-operate in order to facilitate and promote such work;

(c) The nuclear-weapon States, especially those which possess the most important nuclear arsenals, should agree promptly to appropriate verifiable and militarily significant interim measures, with a view to realizing a comprehensive nuclear-test-ban treaty;

(d) Those nuclear-weapon States which have not yet done so should adhere to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water; 8/

3. Also urges the Conference on Disarmament:

(a) To take immediate steps for the establishment, with the widest possible participation, of an international seismic monitoring network with a view to the further development of its potential to monitor and verify compliance with a comprehensive nuclear-test-ban treaty;

(b) To take into account, in this context, the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, including work on the routine exchange and use of wave-form data, and other relevant initiatives or experiments by individual States and groups of States;

7/ See Official Records of the General Assembly, Forty-fourth Session, Supplement No. 27 (A/44/27), para. 54.

8/ United Nations, Treaty Series, vol. 480, No. 6964.

(c) To encourage the widest possible participation by States in the technical test that will take place in 1990 concerning the global exchange and analysis of seismic data;

(d) To initiate detailed investigation of other measures to monitor and verify compliance with such a treaty, including an international network to monitor atmospheric radioactivity;

4. Calls upon the Conference on Disarmament to report to the General Assembly at its forty-fifth session on progress made;

5. Decides to include in the provisional agenda of its forty-fifth session the item entitled "Urgent need for a comprehensive nuclear-test-ban treaty".

81st plenary meeting

15 December 1989

CONFERENCE ON DISARMAMENT

CD/981
30 March 1990

Original: English

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE
TWENTY-NINTH SESSION OF THE AD HOC GROUP OF SCIENTIFIC EXPERTS
TO CONSIDER INTERNATIONAL CO-OPERATIVE MEASURES TO
DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its twenty-ninth formal session from 19-29 March 1990, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-first session of the Group convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group continues to be open to all member States of the Conference on Disarmament, as well as upon request to non-member States. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Canada, China, Czechoslovakia, Egypt, German Democratic Republic, Germany, Federal Republic of, Hungary, India, Iran (Islamic Republic of), Italy, Japan, Netherlands, Pakistan, Poland, Romania, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. At their request and on the basis of previous invitations by the Conference on Disarmament, scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Denmark, Finland, New Zealand, Norway, Spain and Switzerland.
4. Two representatives of the World Meteorological Organization also attended the session.
5. Under the current mandate of the Ad Hoc Group, information on national investigations related to the work of the Group has been presented by experts from Australia, Austria, Belgium, Bulgaria, Canada, Czechoslovakia, Denmark, Egypt, Finland, German Democratic Republic, Germany, Federal Republic of, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Netherlands, New Zealand, Norway, Peru, Poland, Romania, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and United States of America.
6. The Ad Hoc Group reviewed the initial results of experimental activities during Phase 2 of its Second Technical Test (GSETT-2). The Group noted that 21 countries participated in the first stage of the gradual build-up to the

envisaged full-scale operation of the system to be tested. For the 16 January -6 March trial test, National Data Centers (NDCs) were established in each of the 21 participating countries, 4 experimental International Data Centers (EIDCs) were established and operated, and modern international communications links were put into place. The Group considered the overall results of these preliminary tests to be useful for planning the full-scale experiment, although not all of the essential functions were tested. The total volume of data collected, exchanged and analyzed in just one day of this warm-up phase was much greater than the sum of data in all previous experiments undertaken by the Group.

7. Those countries which participated were generally successful in extracting seismic data and transmitting these data to experimental International Data Centres (EIDCs). The Group noted with satisfaction that a number of additional countries expressed their intention to take part in future GSETT-2 activities, and are making preparations in this regard. Still, the Group considers even broader participation to be essential, in order to meet the objectives of GSETT-2.

The Group confirmed that the main focus of attention in GSETT-2 will be on the exchange of seismic waveform segments (Level II data) and the analysis of those data at EIDCs. Nevertheless, the Group agreed that seismic parameter data (Level I data) are also important, and that countries which at present are able to provide seismic parameter data only should also be encouraged to participate.

8. Also at experimental IDCs, valuable experience was gained. The Ad Hoc Group noted that the workload was heavier than expected, and that further procedures must be developed and evaluated in order to fully realize the potential of using Level I and, in particular, Level II data. However, it is essential to establish the planned direct inter-computer satellite links between the EIDCs in Moscow and Washington, D.C.

9. With regard to the use of WMO/GTS for seismic data exchange during GSETT-2, the Group and the WMO representatives agreed that further preparatory work is needed before the WMO/GTS communications channels can accommodate the voluminous Level II data. The Group welcomed a suggestion by the WMO to be represented at the forthcoming meeting (21-28 May 1990) of the WMO Commission for Basic Systems' Working Group on the GTS to discuss this issue and to provide the WMO with the needs of the Ad Hoc Group for GSETT-2. The Ad Hoc Group suggests that, on the understanding that there are no financial implications for the Conference on Disarmament, Mr. Peter Basham of Canada be requested to represent the Group at that meeting, and that Mr. Shigeji Suyehiro of Japan be requested to assist him on this matter.

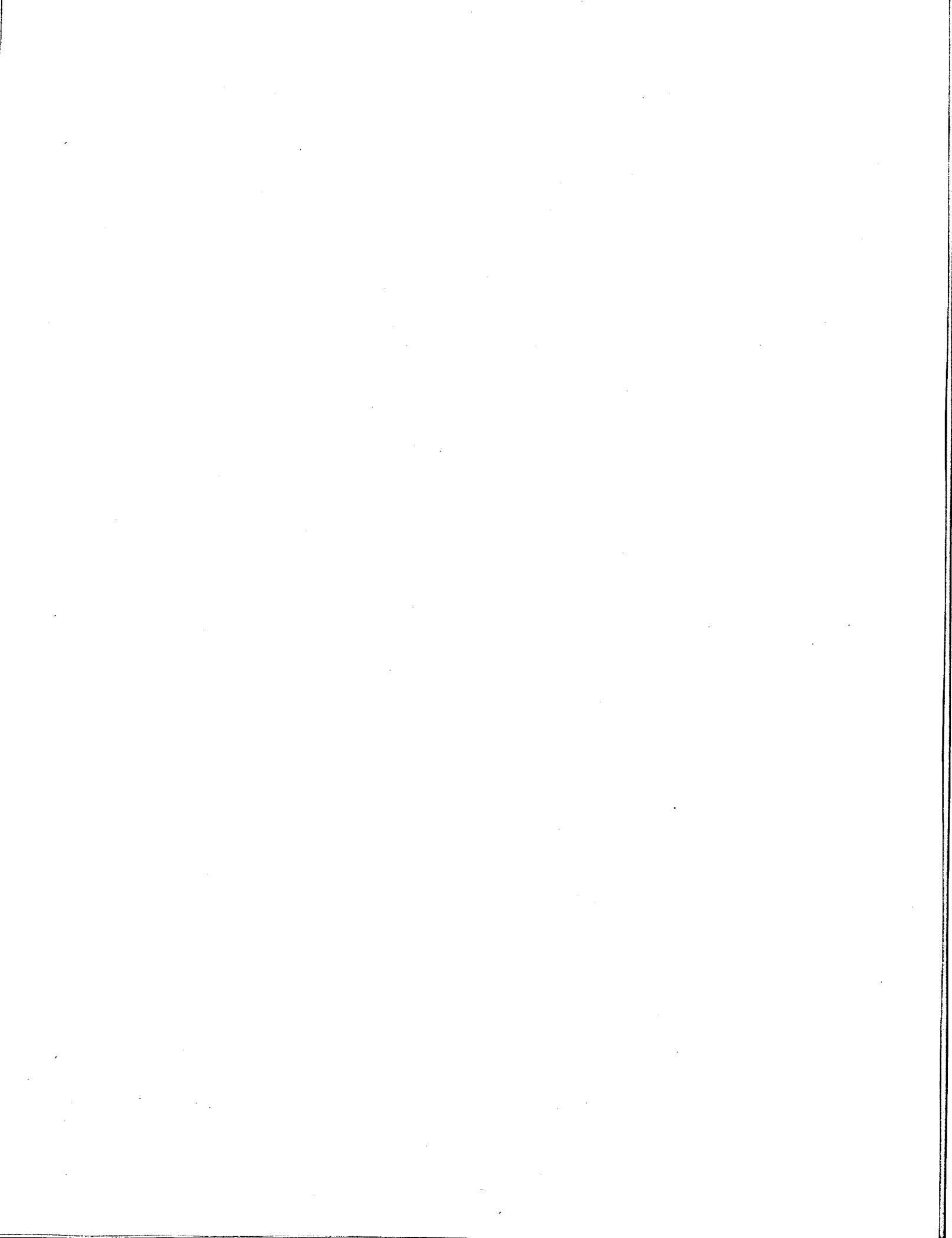
10. In the light of the experience accumulated so far, the Group revised its preliminary plans and instructions for GSETT-2, and agreed to proceed in accordance with the schedule annexed to this progress report.

11. During the time period until the Group's next session, Phase 2 of GSETT-2 will continue with a number of activities, gradually building up to the envisaged full-scale operation of the system to be tested:

- New NDCs will be established by countries planning to join the GSETT-2, and communication links between these NDCs and EIDCs will also be established.
- New procedures will be worked out and tested regarding processing of Level I and II data at EIDCs.
- Tests involving exchange of data from all participating stations and the processing of these data at all four EIDCs will be conducted for four additional days (19, 20, 26, 27 June 1990).

12. The Group also discussed the schedule for the full-scale test (Phase 3) of GSETT-2. In the light of experiences gained so far, and in order to enable additional countries to make the necessary preparations, the Group decided to revise the preliminary schedule. The Group now plans to carry out the full-scale test (Phase 3) in two parts. The first part will comprise preparatory testing during the second half of 1990. The main phase of GSETT-2, involving continuous full-scale operation over an extended period of time, will be conducted during the first half of 1991.

13. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 30 July-10 August 1990.



Annex

Schedule of Remaining GSETT-2 Activities

April 1990 until end of the main phase (Phase 3)

- EIDC facilities remain open for development and testing of NDC-EIDC and inter-EIDC communications links and establishment of correct message formatting by NDCs.
- NDCs conduct practical tests to establish appropriate NDC-EIDC connections.

April, May 1990

- EIDCs work jointly to improve procedures for FEB production by reprocessing data from the March 6 data day, on a schedule to be agreed among them. EIDCs will request NDCs to transmit any missing data for that day.

21-28 May 1990

- Mr. Peter Basham, and Mr. Shigeji Suyehiro (if necessary), attend the meeting of the WMO Commission for Basic Systems' Working Group to conduct preparatory discussions on using the WMO/GTS during GSETT-2.

3-8 June 1990

- Informal meeting of the EIDC Co-ordinators and their technical staff to review results of the April/May reprocessing experiment and work out procedures to be used for further Phase 2 experiments. This meeting will be hosted by the United States EIDC Co-ordinator in Los Angeles.

19, 20, 26, 27 June 1990 (4 data days)

- Further Phase 2 data exchange and processing, according to agreed time schedules.

July 1990

- Further processing at EIDCs of data collected for the June data days, and evaluation of the results in co-operation among IDCs.

30 July-10 August 1990

- Thirtieth GSE session in Geneva to evaluate progress and plan further phases.

12-18 November 1990 (tentative)

- Preparatory test for full-scale experiment - all procedures will be tested for seven consecutive data days.

February 1991

- Thirty-first GSE session in Geneva to evaluate progress and plan the Phase 3 full-scale experiment.

1 April-26 May 1991 (tentative)

- Phase 3 full-scale experiment for 56 consecutive data days.

July/August 1991

Phase 4:

- Thirty-second GSE session in Geneva to evaluate GSETT-2 and prepare a report to the CD.

CONFERENCE ON DISARMAMENT

CD/1010
26 June 1990

Original: ENGLISH

NORWAY

Verification of a Comprehensive Nuclear Test Ban

Report on the Workshop on Seismological Aspects of Nuclear Test Ban Verification in Oslo, Norway, 14-17 February 1990

A Comprehensive Nuclear Test Ban (CTB) must be accompanied by effective verification measures aimed at ensuring that nuclear explosions do not take place in any environment, i.e. in the atmosphere, in space, underwater and underground. Seismology is the principal tool for detecting and identifying underground nuclear explosions, and thus forms the basis for CTB monitoring in the underground environment. This is the background for the workshop on seismological aspects of nuclear test ban verification which was held in Oslo, Norway, 14-17 February 1990.

The workshop was hosted by the Norwegian Ministry of Foreign Affairs and organized by the Norwegian Seismic Array (NORSAR) in co-operation with the Norwegian Council on Arms Control and Disarmament.

The objective of the workshop was, through briefings and demonstrations on seismological facilities in Norway, and through presentation of recent research achievements, to shed further light on seismological verification aspects of a comprehensive nuclear test ban.

The workshop was attended by 76 scientists and representatives from 21 countries, including a large number of seismologists participating in the work of the Conference on Disarmament's Group of Scientific Experts (GSE) in Geneva. Ambassador Miljan Komatina, Secretary-General of the Conference on Disarmament, participated as a special guest on the basis of an invitation by the Norwegian Government.

In his welcoming address the Norwegian State Secretary of Foreign Affairs, Mr. Knut Vollebaek, stated that the holding of this workshop in Oslo demonstrated the great importance which the Government of Norway attaches to the Conference on Disarmament and to Norway's participation in the Conference. He stressed that an efficient verification is a vital component of a test ban, both in order to ensure compliance and to build confidence. With reference to

the work of the Group of Scientific Experts, Mr. Vollebaek said that a global seismological network would constitute an essential element of a verification system for a nuclear test ban. In the opinion of the Norwegian Government such a network should be equipped with instrumentation of high standards and should incorporate recent technological advances with respect to computer and data communication technology. In this regard, Mr. Vollebaek made special reference to the advanced small-aperture arrays NORESS and ARCESS installed in Norway in recent years, and said that arrays of this type could form important contributions to a global seismic network as proposed by the GSE.

The State Secretary of Foreign Affairs stressed that the research at NORSAR is one of Norway's efforts to find solutions to outstanding verification issues relevant to a nuclear test ban. Considerable importance is attached to maintaining NORSAR as a research facility open to scientists from all countries, some of whom have conducted research at NORSAR for periods up to two years. Mr. Vollebaek also confirmed that the Norwegian Government will make the seismological facilities in Norway available as contributing observatories within a global network.

The NORSAR Director, Dr. Frode Ringdal, gave an introductory presentation of the Norwegian seismological verification program. At the NORSAR Data Processing Center, the participants were given a demonstration which included:

- Presentation of the Norwegian arrays
- Detection of earthquakes and underground nuclear explosions
- Seismic signal analysis using regional array data
- International exchange of seismic data, with emphasis on the GSETT-2 experiment undertaken by the Group of Scientific Experts.

The participants also surveyed the field installations of the Norwegian Regional Seismic Array System (NORESS), which is a small-aperture seismic array, incorporating the most recent technological and scientific advances in seismic array design, instrumentation and data processing. A sister array (ARCESS) is located in the arctic region of Finnmark, Northern Norway. In light of the potential of such arrays to provide a much improved monitoring capability for a future comprehensive nuclear test ban treaty. Norway, has proposed to the Conference on Disarmament (CD/714) that the NORESS/ARCESS concept should form the basis for seismic stations within the global network envisaged by the GSE.

The briefings and demonstrations were followed by a three-day scientific symposium, the purpose of which was to assess the state-of-the-art of research on regional seismic arrays and associated topics. In particular, the symposium focused upon research results using NORESS and ARCESS. A special session was devoted to summarizing the experience and discussing further plans for the ongoing international GSE experiment (GSETT-2).

In an annex to this paper, we give a brief review of some of the results presented during the scientific symposium.

In conclusion, the Oslo workshop demonstrated the considerable progress in the field of seismic monitoring during recent years. It particularly highlighted the technological advances in seismic instrumentation, data communication and computer processing, as exemplified by the development of advanced regional seismic arrays with very sophisticated automatic and interactive signal processing facilities. The presentations at the scientific symposium show that these technological advances are accompanied by considerable scientific progress, although much work remains in order to fully exploit the potential offered by regional arrays in a seismic monitoring context. Research toward this end will form the focus of the continued efforts within the Norwegian seismic verification program, and the results will be presented to the Group of Scientific Experts in Geneva.

Annex

Summary of scientific presentations given during the
1990 Oslo Symposium on Regional Seismic Arrays and
Nuclear Test Ban Verification

Development of regional arrays

Reviews of recent developments with regard to regional seismic arrays are presented for NORESS and ARCESS in Norway [1], GERESS in the Federal Republic of Germany [2] and FINESA in Finland [3]. Paper [1] summarizes the design considerations leading to the establishment of the first regional array, NORESS, and describes how the success of this new array concept motivated the deployment of additional arrays of this type. The paper documents the basic signal processing techniques used in real-time data analysis for regional arrays, and demonstrates the excellent detection performance of such arrays at regional distances (less than 2,000 km). It is shown that NORESS and ARCESS are capable of detecting seismic events of magnitude 2.5 with 90 per cent probability, if these events occur within 1,000 km distance. It is stressed, however, that the event identification threshold is necessarily higher than the detection threshold. The FINESA array is also documented to have an excellent performance [3], and together, these three arrays are capable of locating weak seismic events in Fennoscandia very accurately (typically to within 10-20 km). The GERESS array currently under development shows many of the same excellent features [2], and will contribute further to an excellent regional coverage of large parts of Northern Europe.

Processing of data from a network of regional arrays

Recent technological advances have allowed very sophisticated processing techniques to be applied in seismic monitoring research using a network of seismic arrays and single stations, and this is highlighted by the development of the Intelligent Monitoring System (IMS) [4], [5]. Two of the goals for this system are (1) to demonstrate the monitoring performance and capability of the system for small events at regional distances and (2) to explore the promise of an expert-systems approach for providing improved monitoring performance as experience accumulates. The first operational version, described in [4], processes data from NORESS and ARCESS, whereas later versions will be expanded to networks including both arrays and single station. The IMS is ambitious in exploring and integrating many new computer technologies, but the validity of the concept is documented in an evaluation of its initial operational performance [5].

Signal analysis methods

A number of presentations addressed methods for processing seismic signals recorded by arrays as well as 3-component stations. It was demonstrated that both types of stations can provide information very useful in phase identification, azimuth estimation and estimating the apparent velocity of detected phases. From theoretical considerations as well as from experimental comparison [12], [26], [14] arrays are shown to be superior in this regard at low signal-to-noise ratios, although the precision e.g. of azimuth estimates is influenced by a number of factors, including phase

type, frequency of the signal and systematic bias caused by earth heterogeneities [14], [18], [26]. A very promising approach, discussed in [17] is that of joint analysis of 3-component and array data.

Signal detection methods are discussed in several papers. In [11], a system for on-line detection and signal analysis is presented as applied to a Soviet 3-component station in Kazakhstan. In [13], a detection technique is described using NORESS array and 3-component data. A statistical approach, using adaptive techniques, to detection processing and estimation is presented in [7] for array data and [15] for 3-component data. A new approach to obtain precise relative location estimates of seismic events, using high frequency recordings, is presented in [25].

Source identification

Traditionally, seismic discrimination research has focused on distinguishing between earthquakes and underground nuclear explosions. Under a comprehensive test-ban treaty, emphasis will be on detecting and identifying weak seismic events, and a third category, large chemical explosions for industrial purposes (e.g. mining work) will become important to consider. In [10], a very promising method is applied to NORESS data to discriminate between earthquakes and ripple-fired quarry blasts (mining events consisting of several explosions closely grouped in space and time). Using spectral characteristics of the signals, an "automatic" discriminant is proposed computing the likelihood that ripple-firing occurred in each given case.

In [8], a novel approach making use of artificial neural network is used to develop a classification procedure between earthquakes and mining explosions. Also in this approach, the spectral characteristics of the signals form the basis for the discriminants. The neural network appears to improve in particular the classification of outliers in the population, and reduce the number of uncertain events. Application of neural networks in improving seismic processing performance is also addressed in [9].

Of considerable interest for source identification is also the method proposed in [16], applying transfer functions to transform e.g. between recordings of presumed single explosions and ripple-fired explosions, and also between recordings at different NORESS sensors for a given event. This gives promise to improve the coherence of seismic phases recorded at an array, with ensuing implications for improved source parameter estimation. In [6], a case-based reasoning approach to event identification is discussed, and a waveform envelope matching technique is applied to a set of Western Norway earthquakes and explosions.

Detection thresholds and in-country networks

While regional arrays were originally designed to enhance the capabilities for detecting and characterizing weak seismic events at regional distances, they have also been found very effective in the teleseismic distance range. As an example, published yields of Soviet underground nuclear explosions at Semipalatinsk have been used to evaluate the NORESS detection threshold, in terms of explosive yield for events at this test site [21]. The threshold for detection at NORESS is estimated to be as low as 0.1 kt, assuming

full coupling and normal noise conditions. It is pointed out that NORESS has particularly favourable conditions for detecting small events from this test site, and that the seismic identification threshold necessarily will be higher than the detection threshold.

Data from new Global Seismic Network stations in the Soviet Union, installed as a co-operative project between American and Soviet scientists, have been applied in several studies to address problems relevant to an in-country monitoring network. Seismic noise levels at these stations are analysed in [19], and found to be higher than at NORESS in the band 1-20 Hz, with maximum difference ranging from 7 to 25 dB, depending on the station. However, significant noise reduction can be achieved by borehole deployment.

Using data from stations in the USSR, the frequency-dependent attenuation of regional seismic phases has been studied in [22]. Attenuation characteristics are found to be similar to those observed in Scandinavia, but with an absolute Pn amplitude almost a factor of 2 higher in eastern Kazakhstan for a fixed Lq magnitude.

Recordings of Semipalatinsk nuclear explosions at the new Global Seismic Network station in the Soviet Union, together with data from stations in China have been analysed in [20] and it is shown that RMS Lq can be measured at widely separated stations with a remarkable degree of consistency. The standard deviation of the differences between pairs of stations is as low as 0.03-0.04 in logarithmic units, and reliable measurements may be made at magnitude (m_G) down to about 4.0 for stations situated about 1,500 km away from Semipalatinsk. The importance of this observation in terms of supplying yield estimates for nuclear explosions down to and even below the one kiloton is pointed out.

Earth structure, wave propagation, scattering

Several of the papers were devoted to studies of general problems in seismology and geophysics, in areas relevant to the seismic monitoring issue. The structure of the crust and upper mantle in parts of Northern Eurasia is addressed in papers [23], [24], [27] and [29], with the three latter papers specifically making use of regional array data. Seismic wave propagation and scattering are addressed in a number of papers, e.g. [13], [26], [28], [29], [30].

References

- [1] Svein Mykkeltveit, (1) Frode Ringdal (1) and Ralph W. Alewine (2) - (1) NORSAR, Norway, and (2) DARPA, USA: "Application of Regional Arrays in Seismic Verification Research".
- [2] Hans Peter Harjes - Bochum Univ., Fed. Rep. of Germany: "Design and Siting of a New Regional Array in Central Europe".
- [3] Marja Uski - University of Helsinki, Finland: "The Upgraded FINESA Array and Experiences of Data Analysis".
- [4] Thomas C. Bache, (1) James Wang, (1) Robert M. Funq, (2) Cris Kobryn (1) and Jeffrey Given (1) - (1) Science Applications International Corp., USA, and (2) Advanced Decision Systems, USA: "The Intelligent Monitoring System".
- [5] Steven Bratt, Henry Swanger, Richard Stead and Floriana Ryall - Science Applications International Corp., USA: "Results from the Intelligent Monitoring System".
- [6] Douglas Baumgardt and Gregory Young - ENSCO, Inc., USA: "Regional Seismic Waveform Patterns and Case-based Event Identification using Regional Arrays".
- [7] A. Kushnir, V. Laphsin, V. Pinsky and V. Pisarenko - Inst. of Physics of the Earth, USSR: "Statistical Procedures for Seismic Signal Detection and Estimation by using Small Array Data".
- [8] Paul Dysart (1) and Jay Pulli (2) - (1) Science Applications International Corp., USA, and (2) Radix Systems, Inc., USA: "Regional Seismic Event Classification at the NORESS Array: Seismological Measurements and the Use of Trained Neural Networks".
- [9] Kenneth Anderson - BBN, USA: "Automatic Improvement of Seismic Array Performance".
- [10] Michael J. Hedlin, J. Bernard Minster and John A. Orcutt - Scripps Institute of Oceanography, UCSD, USA: "An 'Automatic' Means to Discriminate between Earthquakes and Quarry Blasts".
- [11] O.K. Kedrov and V.M. Ovtchinnikov - Inst. of Earth Physics, USSR: "An On-Line Analysis System for Three-Component Seismic Data: Method and Preliminary Results".
- [12] David B. Harris - Lawrence Livermore National Laboratory, USA: "A Comparison of the Direction Estimation Performance of High-Frequency Seismic Arrays and Three-Component Stations".
- [13] B.O. Ruud, E.S. Husebye and S.C. Bannister - University of Oslo, Norway: "NORESS Recording - Joint 3C and Array Analysis".
- [14] Anne Suteau-Henson - Science Applications International Corp., USA: "Estimating Azimuth and Slowness from Three-Component and Array Stations".

- [15] A. Kushnir, V. Pinsky, V. Pisarenko and I. Savin - Institute of Physics of the Earth, USSR: "Wavelet Decomposition and Parameter Estimation Using 3-Component Seismograms".
- [16] Zoltan A. Der (1) and Robert H. Shumway (2) - (1) ENSCO, Inc., USA, and (2) University of California at Davis, USA: "Coherent Array Processing of Regional Seismic Data for Ripple Fire Patterns, Source Mechanisms and Source Azimuths".
- [17] D.C. Jepsen and B.L.N. Kennett - Australian National University, Canberra, Australia: "Three-component Array Analysis of Regional Seismograms".
- [18] Dorthe Bame, Marianne C. Walck and Kathie L. Hiebert-Dodd - Sandia National Laboratory: "Azimuth Estimation Capabilities of the NORESS Regional Seismic Array".
- [19] Holly K. Given - Scripps Inst. of Oceanography, UCSD, USA: "Broadband Seismic Noise and Detection Experiments at IRIS/IDA Stations in the USSR".
- [20] Roger A. Hansen, (1) Frode Ringdal (1) and Paul G. Richards (2) - (1) NORSEAR, Norway, and (2) Lamont-Doherty Geological Observatory, USA: "The Stability of RMS Lq Measurements, and their Potential for Accurate Estimation of the Yields of Soviet Underground Nuclear Explosions".
- [21] Frode Ringdal - NORSEAR, Norway: "Teleseismic Event Detection using the Small-Aperture NORESS and ARCESS Arrays".
- [22] Thomas Sereno - Science Applications International Corp., USA: "Frequency-Dependent Attenuation in Eastern Kazakhstan and Implications for Seismic Detection Thresholds in the Soviet Union".
- [23] A. Egorkin - International Inst. of Earthquake Prediction, USSR: "New Methods of Seismic Surface Wave Data Processing and its Application for the Study of the North Eurasian Shelf Structure".
- [24] Vladimir Ryaboy - Science Applications International Corp., USA: "Upper Mantle Structure along a Profile from Oslo (NORESS) to Helsinki to Leningrad, based on Explosion Seismology".
- [25] Hans Israelsson - Science Applications International Corp., USA: "Studies Using Seismic High Frequency Data".
- [26] Erik Ødegaard, (1) Durk Doornbos (1) and Tormod Kvaerna (2) - (1) University of Oslo, Norway, and (2) NORSEAR, Norway: "Topographic Effects on Arrays and Three-Component Stations".
- [27] Kristin Vogfjord and Charles Langston - Penn State Univ., USA: "Analysis of Regional Events Recorded at NORESS".
- [28] I. Gupta, C.S. Lynnes and R.A. Wagner - Teledyne Geotech, USA: "F-K Analysis of NORESS Array and Single-Station Data to Identify Sources of Near-Receiver and Near-Source Scattering".

[29] Douglas Baumgardt - ENSCO, Inc., USA: "Investigation of Teleseismic Lq Blockage and Scattering using the NORESS and ARCESS Regional Arrays".

[30] Anton Dainty and M. Nafi Toksoz - Earth Resources Lab., MIT, USA: "Array Analysis of Seismic Scattering".

Proceedings from the symposium will be published as a Special Issue of the Bulletin of the Seismological Society of America, scheduled to appear in the fall of 1990. Copies of this Special Issue will be distributed to all participants in the Group of Scientific Experts.

CONFERENCE ON DISARMAMENT

CD/1016 */
17 July 1990

Original: ENGLISH

Mandate for an Ad Hoc Committee under Agenda Item 1

"Nuclear Test Ban"

(Adopted at the 565th plenary meeting on 17 July 1990)

In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final Document, the Conference on Disarmament decides to re-establish an Ad Hoc Committee under item 1 of its agenda entitled "Nuclear Test Ban".

The Conference requests the Ad Hoc Committee to initiate, as a first step towards achieving a nuclear test ban treaty, substantive work on specific and interrelated test ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad Hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad Hoc Committee to examine the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test ban treaty. The Ad Hoc Committee will also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1990 session.

*/ Re-issued for technical reasons.

10 August 1990
Original: English

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE
THIRTIETH SESSION OF THE AD HOC GROUP OF SCIENTIFIC EXPERTS
TO CONSIDER INTERNATIONAL CO-OPERATIVE MEASURES TO
DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirtieth formal session from 30 July-9 August 1990, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-second session of the Group convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group continues to be open to all member States of the Conference on Disarmament, as well as upon request to non-member States. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Belgium, Canada, China, Czech and Slovak Federal Republic, Egypt, German Democratic Republic, Germany, Federal Republic of, Hungary, Iran (Islamic Republic of), Italy, Japan, Kenya, Netherlands, Pakistan, Romania, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. At their request and on the basis of previous invitations by the Conference on Disarmament, scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Denmark, Finland, New Zealand, Norway, Spain and Switzerland.
4. Two representatives of the World Meteorological Organization (WMO) also attended the session.
5. Under the current mandate of the Ad Hoc Group, information on national investigations related to the work of the Group has been presented by experts from Australia, Austria, Belgium, Bulgaria, Canada, China, People's Republic of, Czech and Slovak Federal Republic, Denmark, Egypt, Finland, German Democratic Republic, Germany, Federal Republic of, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Kenya, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Romania, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and United States of America.

6. The Ad Hoc Group reviewed the results of experimental activities during Phase 2 of its Second Technical Test (GSETT-2). The Group noted that 25 countries participated in the 19-27 June trial test, which was undertaken as part of a gradual build-up to the envisaged full-scale testing of the system. For the test period, National Data Centers (NDCs) were operated in each of the 25 participating countries, 4 experimental International Data Centers (EIDCs) were operated, and modern international communications links were utilized. Compared to the previous test conducted during January-March 1990, the June test showed improvements in the functioning of all parts of the system. However, the Group noted that there is still a need for further improvements before full-scale testing can be conducted for an extended time period.

7. The participation of 25 countries in the June test represents an increase from the 21 countries which took part in the previous test. The Group noted with satisfaction that a number of additional countries have expressed their intention to take part in future GSETT-2 activities, and are making preparations in this regard. Still, the Group considers even broader participation to be essential, in order to meet the objectives of GSETT-2.

The Group reconfirmed that the main focus of attention in GSETT-2 will be on the exchange of seismic waveform segments (Level II data) and the analysis of those data at EIDCs. Nevertheless, the Group considers that seismic parameter data (Level I data) are also important, and that countries which at present are able to provide seismic parameter data only should also be encouraged to participate.

8. Those countries which participated made considerable progress in extracting seismic data according to the agreed procedures. However, for some countries further development and testing needs to be done in order to improve the procedures at the NDCs and to establish reliable communication between their NDCs and the EIDCs.

9. At the EIDCs, valuable experience was gained during the June test. The Group noted in particular that the seismological quality of the Final Event Bulletins was improved compared to previous tests, but that it is still not satisfactory in all regards.

10. The Ad Hoc Group reviewed results from a meeting of EIDC coordinators held in the United States on 3-8 June, 1990, and agreed to modify the instructions for EIDC procedures in light of the recommendations from that meeting. In particular, the EIDCs will in the future make more extensive use of analysis results obtained at the NDCs, and also place greater emphasis upon processing of seismic waveforms.

11. As suggested by the Ad Hoc Group during its twenty-ninth session, and subsequently approved by the Conference on Disarmament, the Co-ordinator of GSETT-2, Mr. Peter Basham of Canada represented the Group at the meeting 21-28 May 1990 of the WMO Commission for Basic Systems' Working Group on the GTS and provided this Working Group with the requirements for GTS circuits to be tested in GSETT-2. Bilateral arrangements will need to be made in order to ensure reliable communication for those countries which will be using the WMO/GTS during GSETT-2. The Ad Hoc Group will inform the WMO about its time schedule for future testing activities.

12. The Ad Hoc Group also conducted initial discussions on evaluation criteria for GSETT-2, based upon draft guidelines worked out by a specially appointed study group.

13. In the light of the experience accumulated so far the Group revised its preliminary plans and instructions for GSETT-2, and agreed to proceed in accordance with the schedule annexed to this progress report.

14. During the time period until the Group's next session, GSETT-2 will continue with a number of activities, gradually building up to the envisaged full-scale testing of the proposed system concepts:

- New NDCs will be established by countries planning to join the GSETT-2, and communication arrangements between these NDCs and EIDCs will be made.
- New procedures will be worked out and tested regarding processing of Level I and II data at EIDCs.
- Experimental exchange of data for the purpose of testing the communication facilities will be carried out during the period 15 October - 2 November 1990.

15. The Group also discussed the schedule for the full-scale test (Phase 3) of GSETT-2. Phase 3 will be carried out in two parts. The first part will take place from 26 November - 9 December 1990, and will involve exchange of data from all participating stations for 7 consecutive data days and processing of these data at the four EIDCs. The main phase of GSETT-2, involving continuous full-scale testing over an extended period of time, will be conducted during the first half of 1991.

16. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 11-22 February 1991.

Annex

Schedule of Remaining GSETT-2 Activities

August 1990 until end of Phase 3

- EIDC facilities remain open for development and testing of NDC-EIDC and inter-EIDC communications links and establishment of correct message formatting by NDCs.
- NDCs conduct practical tests to establish appropriate NDC-EIDC connections.

15 October - 2 November 1990

- Experimental exchange of data for the purpose of testing the message formats and communication facilities according to instructions provided in CRP/190/Rev.4.

26 November - 9 December 1990

- Preparatory test for full-scale experiment - all procedures will be tested for the seven consecutive data days 26 November - 2 December.

11-22 February 1991

- Thirty-first GSE session in Geneva to evaluate progress and plan the Phase 3 full-scale experiment.

1 April-26 May 1991 (tentative)

- Phase 3 full-scale experiment for 56 consecutive data days.

July/August 1991

Phase 4:

- Thirty-second GSE session in Geneva to evaluate GSETT-2 and prepare a report to the CD.

Evaluation:

- Comments and suggestions to the draft questionnaires distributed by the study group on evaluation should be returned to the convenor, Dr. Hans-Peter Harjes of the Federal Republic of Germany before 30 September 1990.
- Revised questionnaires will be distributed and are to be filled out by participants, on a voluntary basis, during the 26 November - 9 December test.
- Completed questionnaires should be returned to the convenor before 31 December 1990.

CONFERENCE ON DISARMAMENT

CD/1035
20 August 1990

Original: ENGLISH

Report of the Ad Hoc Committee on a Nuclear Test Ban

I. INTRODUCTION

1. At its 565th plenary meeting on 17 July 1990, the Conference on Disarmament adopted the following decision on the re-establishment of an ad hoc committee under item 1 of its agenda entitled "Nuclear Test Ban" (CD/1016):

"In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final Document, the Conference on Disarmament decides to re-establish an Ad Hoc Committee under item 1 of its agenda entitled "Nuclear Test Ban".

The Conference requests the Ad Hoc Committee to initiate, as a first step towards achieving a nuclear test ban treaty, substantive work on specific and interrelated test ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad Hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad Hoc Committee to examine the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test ban treaty. The Ad Hoc Committee will also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1990 session."

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II. ORGANIZATION OF WORK AND DOCUMENTATION

2. At that same plenary meeting on 17 July 1990, the Conference on Disarmament appointed Ambassador Mitsuro Donowaki of Japan as Chairman of the Ad Hoc Committee. Mr. Michael Cassandra of the United Nations Department of Disarmament Affairs served as Secretary.

3. Also at that same plenary meeting on 17 July 1990, a delegation of a nuclear weapon State confirmed its previously announced decision that it would refrain from participating in the work of the Ad Hoc Committee. A number of delegations regretted that decision and expressed the hope that it would be reconsidered at an early date.

4. The Ad Hoc Committee held 6 meetings from 20 July to 17 August 1990. In addition, the Chairman conducted a number of informal consultations with delegations.

5. At their request, the representatives of the following 16 States not Members of the Conference were invited to participate in the work of the Ad Hoc Committee: Austria, Denmark, Finland, Greece, Honduras, Malaysia, New Zealand, Norway, Oman, Spain, Switzerland, Syrian Arab Republic, Turkey, United Arab Emirates, Uruguay, Zimbabwe.

6. The following official documents dealing with a nuclear test ban were presented to the Conference:

- CD/1010, dated 26 June 1990, submitted by the delegation of Norway, entitled "Verification of a Comprehensive Nuclear Test Ban: Report on the Workshop on Seismological Aspects of Nuclear Test Ban Verification in Oslo, Norway, 14-17 February 1990."
- CD/1016, dated 17 July 1990, entitled "Mandate for an ad hoc committee under agenda item 1."

In addition, the following working papers were presented to the Ad Hoc Committee:

- CD/NTB/WP.10, dated 25 July 1990, entitled "Message of the Minister for Foreign Affairs of Japan, H.E. Mr. Taro Nakayama, read out by the Chairman of the Ad Hoc Committee on a Nuclear Test Ban at its first meeting on 20 July 1990".
- CD/NTB/WP.11, dated 31 July 1990, entitled "Statement by New Zealand Permanent Representative, Mr. T.J. Hannah, made at the meeting of the Ad Hoc Committee on a Nuclear Test Ban on 27 July 1990".
- CD/NTB/WP.12, dated 2 August 1990, submitted by the delegation of the United Kingdom, entitled "Seismic Monitoring for a Comprehensive Nuclear Test Ban" (re-submission of CD/610 of 9 July 1985).

The following conference room papers were before the Ad Hoc Committee:

- CD/NTB/CRP.7, dated 20 July 1990, entitled "Indicative Timetable of Meetings".
- CD/NTB/CRP.8, dated 16 August 1990, and Rev.1, dated 17 August 1990, entitled "Draft Report of the Ad Hoc Committee on a Nuclear Test Ban".

Furthermore, upon the request of the Ad Hoc Committee, the Secretariat updated a list of documents relating to a Nuclear Test Ban, submitted to the Conference of the Eighteen Nation Committee on Disarmament, the Conference of the Committee on Disarmament, the Committee on Disarmament, and the Conference on Disarmament (CD/NTB/INF.1/Add.1).

III. SUBSTANTIVE WORK DURING THE 1990 SESSION

7. At its first meeting on 20 July 1990, the Ad Hoc Committee took the following decisions with respect to its work for the short time at its disposal before the end of the 1990 session, namely:

- i) that there should be no written programme of work for the 1990 session;
- ii) that the Ad Hoc Committee conduct a general exchange of views based on its above mandate, specifically paragraphs 2, 3 and 4, as its de facto programme of work;
- iii) that, in order to take into account the work of the Conference's Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, officials of the Ad Hoc Group be invited to report to the Ad Hoc Committee;
- iv) that the Chairman conduct informal consultations, parallel to the formal meetings of the Ad Hoc Committee, on a detailed programme of work to prepare the ground for future consideration of the item.

8. The work of the Ad Hoc Committee took place in the light of the many views that had been expressed in plenary meetings of the Conference throughout the 1990 session as contained in its official records.

9. A general exchange of views was held during the four meetings which the Ad Hoc Committee devoted to substantive work. All delegations welcomed the re-establishment of the Ad Hoc Committee as it offered a long awaited opportunity for a focused consideration of the issue. Though the Ad Hoc Committee had little time at its disposal, delegations felt that these preliminary deliberations could be useful in preparing the ground for further consideration of the issue. They also shared the wish that the positive changes in the international political environment may facilitate the Ad Hoc Committee's work on the agenda item.

10. Members of the Group of 21 stressed again the urgent and crucial need for, and the high priority it has always attached, to putting an end to nuclear testing. They reiterated that a nuclear test ban would make a significant contribution to the aim of halting and reversing the nuclear arms race and nuclear disarmament. It again stressed that the Conference on Disarmament, as the single multilateral negotiating body on such issues, had the primary role in negotiations on a nuclear test ban. The Group pointed to the numerous documents adopted unanimously by the United Nations, including the Final Document of the first special session of the General Assembly devoted to disarmament. They also referred to the relevant part of the Declaration of the Heads of State or Government of the Non-Aligned Summit in Belgrade. They maintained that despite the recent upturn in the world political climate, there had been no let up in the qualitative improvement in nuclear weapons. The Group underlined the flexibility it had demonstrated over the years with respect to the re-establishment of the Ad Hoc Committee and considered it essential that the Ad Hoc Committee's setting up this year lead to concrete negotiations towards a comprehensive nuclear test ban treaty on an urgent basis. The Partial Test Ban Treaty of 1963 has prohibited nuclear weapon testing in the atmosphere, outer space and under water. The Group remained convinced that the available techniques of national and international verification were already sufficient to conclude a treaty on a nuclear test ban which should aim at the general and complete cessation of nuclear weapon tests by all States, in all environments, for all times. Thus it felt that the work of the Ad Hoc Committee should not get bogged down in peripheral exercises of a work programme or debate on verification pre-requisites while the central issue of negotiating a treaty on a nuclear test ban remains unresolved.

11. Some delegations of this Group believed the Ad Hoc Committee should take into account concrete proposals already presented to the Conference, specifically pointing to the draft treaties proposed by Sweden and the USSR in 1983. Many delegations of the Group emphasized that the fact that the mandate of the Committee indicated that the four elements of structure, scope, verification and compliance are interrelated precluded any selective approach and therefore called for substantive consideration of each of them in an harmonious and simultaneous manner. It was also suggested that the Ad Hoc Committee consider the need for harmonization between its work and the bilateral USSR/United States process on nuclear testing. Some delegations of this Group also stressed the complementarity between the work in the Conference on Disarmament on agenda item 1 and the holding of the Conference of the States Parties to the Partial Test Ban Treaty for the purpose of converting it into a comprehensive ban. Some members of the Group underscored the positive impact the re-establishment of the Ad Hoc Committee would have on the 4th Review Conference of the Nuclear Non-Proliferation Treaty in August-September this year. Several delegations called for a moratorium on nuclear testing during the course of the Conference's work on the item. It was also suggested that negotiations on a nuclear test ban should duly take into account the question of the peaceful nuclear explosions and for that purpose it was suggested that a review of all background information should be conducted. One delegation belonging to Group of 21 stated that as early as in 1954 it had called for a standstill agreement on the suspension of nuclear weapon tests pending agreement on control and production of nuclear weapons. Had this agreement been achieved earlier,

three generations of nuclear weapons would not have been invented. The world community had lost valuable time in the achievement of this goal. However, an understanding on a moratorium on nuclear weapons testing could still be achieved, pending the conclusion of a comprehensive test ban treaty, in keeping with the 6-Nation Initiative. It remained convinced that there could be no comprehensive test ban treaty as long as even one of the nuclear weapon States remained outside these negotiations, as long as nuclear weapon tests were thought necessary for maintaining a credible policy of nuclear deterrence and as long as a comprehensive test ban was treated only as a long-term goal.

12. Two delegations of the Group stated that a comprehensive test ban treaty must, in order to have minimum credibility, be drawn up with the active participation of all powers presently carrying out nuclear weapon tests. In their view, it should at the same time not become an instrument whereby continued testing was condoned through phased schemes that guarantee its conduct at lower yields or number. They believed as well that the elaboration of a nuclear test ban with adequate mechanisms to monitor compliance, should avoid unnecessary provisions which might lead to any additional controls or constraints on the transfer of technology for peaceful uses of nuclear energy.

13. Addressing the practical aspects linked with future activities of the subsidiary organ, many delegations of the Group considered that it could be useful to set up two separate working groups to deal in a structured way with the four elements spelt out in the Committee's mandate.

14. Members of the Group of East European and other States remained convinced that a prohibition of nuclear weapons tests was the key to containing the nuclear arms race and to considerably checking the refinement of nuclear weapons, thus bringing closer the ultimate goal of a nuclear-free world. Members of the Group stressed the beneficial effect that the re-establishment of the Ad Hoc Committee would have in strengthening the Treaty on Nuclear Non-Proliferation and, in particular, the contribution it could make to a successful fourth review of that instrument. The Group reaffirmed its belief that all avenues should be used to achieve progress on the issue, and, in that context, welcomed the signing by the USSR and the United States of the Protocols to the Threshold Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of 1976 as a step towards a comprehensive test ban treaty. They welcomed the re-establishment of the Ad Hoc Committee and the spirit of flexibility manifested by members of the Conference which allowed for its setting up. They underlined the many developments that had taken place since the Conference last established subsidiary bodies on the item in 1982 and 1983, and the considerable wealth of experience at hand. They pointed to the many proposals and ideas already put forward over the years. They felt that the Ad Hoc Committee should concentrate its work on identifying areas where consensus was in reach. They supported from the very beginning that the Chairman conduct informal consultations, parallel to the formal meetings of the Ad Hoc Committee, on a detailed programme of work to prepare the ground for future consideration of the item. They suggested that the Chairman continue to prepare the ground, in an appropriate framework until the beginning of the 1991 session of the Conference, taking into account the latest developments in this field.

15. A nuclear-weapon State, member of that group, expressed its continued commitment to the early achievement of a comprehensive test ban as not only a measure to curb the nuclear arms race but an important means of promoting non-proliferation of nuclear weapons as well. Based on this assessment of the importance and the role of this problem in world affairs, it was prepared to use all possible ways and means in order to reach its early resolution - be it through bilateral negotiations or multilateral efforts, through widening the scope of the 1963 Moscow Treaty or through a joint declaration together with the United States on a nuclear tests moratorium. It continued to believe that a step-by-step approach to the achievement of a comprehensive ban was justifiable. It pointed to that approach in its bilateral negotiations on nuclear testing with the United States and stressed that the first goal of those negotiations had been reached with the signing of the two Protocols to the Threshold Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of 1976. It underlined its support for a continuation of those negotiations to consider further limitations on the quantity and yield of nuclear tests. It stated its conviction that a final resolution of the problem of stopping nuclear tests required focusing the efforts of relevant multilateral bodies as well. In its view, bilateral and multilateral efforts may and should complement each other. It expressed the opinion that such a representative forum as the Conference on Disarmament would also make its tangible contribution to the solution of this problem through its Ad Hoc Committee.

16. A group of Western countries continued to stress its commitment to a world free of nuclear weapons, in peace and stability. Members of the group firmly re-stated their belief that the Conference on Disarmament, as the only global multilateral negotiating forum for disarmament questions, was the most appropriate place for in-depth discussion of multilateral aspects of a nuclear test ban. They welcomed the re-establishment of the Ad Hoc Committee, the work of which would inevitably be of a step-by-step nature. The Group favoured a detailed discussion on the whole range of issues related to a nuclear test ban. They noted that the Committee's mandate did not require it to enter into negotiation of a treaty text, and that before that stage could be reached there was much work to be done. They felt that much relevant work had been done since the Conference had last established a subsidiary body on nuclear testing, particularly on development and implementation of verification measures. They pointed particularly to the important work of the Ad Hoc Group of Scientific Experts and, in the bilateral field, to procedures developed by the United States and the Soviet Union for verification of 1974 Threshold Test Ban Treaty and 1976 Peaceful Nuclear Explosions Treaty. They noted, however, that adequate means for effectively verifying a comprehensive test ban were not yet at hand, and that further work on the whole range of monitoring techniques remained to be undertaken.

17. A nuclear weapon State, member of the Western group, reaffirmed once again that a comprehensive test ban remained a long-term objective. It still maintained that a comprehensive ban must be seen in the context of a time when it is no longer necessary to depend on nuclear deterrence to ensure international security and stability. It again stressed that the following needed to be achieved before reaching agreement on a comprehensive ban: broad, deep and verifiable arms reductions; greatly improved verification capabilities; expanded confidence-building measures and greater balance in

conventional forces. It pointed out that contrary to the beliefs of some, even the most effective seismic monitoring system was only one element of effective verification. It reaffirmed that it would continue to deal with the question on the basis of a step-by-step approach. It welcomed the re-establishment of the Ad Hoc Committee with a non-negotiating mandate and stressed it would contribute fully as well as share the results of its research in relevant technologies.

18. Another Western nuclear weapon State stressed that, for its part as well, a comprehensive test ban remained a long-term objective, progress on which should be made on a step-by-step basis. It stressed that the vital element in achieving a comprehensive test ban would be the willingness of those who are currently testing to stop testing. It reiterated the three criteria it felt would be needed to be satisfied or which should be used in consideration as to whether or not a State currently wished to stop testing. They were: the degree of reliance on nuclear weapons for security; the relative importance of testing, among the techniques available, to ensure effectiveness and reliability of the residual nuclear weapon stocks at the time the test ban comes into force; and confidence in the effectiveness of a nuclear test ban treaty. It also welcomed the re-establishment of the Ad Hoc Committee and reiterated its willingness to contribute to its work in establishing the necessary components for an effective treaty.

19. Another nuclear weapon State, not member of any group, stated that it understood the urgent desire of the Third World countries and the non-nuclear-weapon States for a nuclear test ban at an early date. It reiterated the importance that it had attached to the issue of a nuclear test ban in the context of its continued stand in favour of the complete prohibition and thorough destruction of all nuclear weapons. It again repeated that in order to stop the nuclear arms race and achieve nuclear disarmament, the two States possessing the largest nuclear arsenals should take the lead in halting the development, production and deployment of all nuclear weapons and drastically reducing their nuclear arsenals. The same State welcomed the re-establishment of the Ad Hoc Committee, in which it had decided to participate, and confirmed that it would take an active part in its work.

20. Many delegations addressed the subject of structure and scope of a nuclear test ban treaty. Many delegations stressed the urgency of reaching agreement, while other delegations stressed again the need for a gradual approach to the achievement of a comprehensive ban. Many delegations stressed that the gradual approach to the elimination of nuclear weapons tests would not halt the modernization of nuclear weapons but rather legitimize the holding of such tests. Some other delegations pointed to the need for further discussion on the question of nuclear explosions for peaceful purposes. They also felt that such a treaty should ensure that the majority of nations should not be denied the full benefit of technological advancement in the nuclear field. Several delegations supported the idea that a moratorium on nuclear explosions for peaceful purposes be agreed upon until agreement was reached on the conditions under which such explosions could be carried out. It was suggested to bear in mind the idea that a comprehensive agreement could contain time frames for phasing out of all tests. A suggestion was made that a treaty should provide that no party cause,

encourage or in any way participate in the conduct of any nuclear weapon test explosion anywhere. With respect to the structure of a treaty, the idea was forwarded that the structure of a treaty was related to those questions which would need to be dealt with under scope. It was also suggested that one element to be considered was the relationship of a treaty to other international agreements of a bilateral or regional nature relating to the question. Several delegations stressed that in the future consideration of the structure of the treaty, special attention should be given to the relationship of a comprehensive test ban treaty with other relevant agreements which could have a bearing on the activities of States in this and other related fields. In this sense, they recalled the necessity to avoid unnecessary duplications or contradictions between different norms.

21. One delegation belonging to the Group of 21 stated that it was clear from the trilateral negotiators' joint report to the Committee on Disarmament in 1980 that the three negotiators had agreed upon a scope of the treaty on nuclear test ban, i.e., to have a treaty prohibiting nuclear weapon test explosions in all environments and a protocol covering nuclear explosions for peaceful purposes. While the main treaty was to be on the prohibition of nuclear weapon tests, the protocol on PNEs was to establish a moratorium on nuclear explosions for peaceful purposes until arrangements for conducting them were worked out. In the view of this delegation, the scope of a comprehensive test ban treaty had been clearly spelt out in the Preamble of the Partial Test Ban Treaty of 1963 which committed the parties to the objectives of achieving the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end. During the earlier conception of a comprehensive test ban treaty, peaceful explosions had always been assigned a separate role. The original intention at the time of the negotiation of the PTBT clearly was to maintain a dividing line between nuclear weapon tests which were to be prohibited entirely and nuclear explosions for peaceful purposes to be allowed under certain conditions. All the existing international arrangements which referred to the nuclear tests contained separate provisions for peaceful nuclear explosions. In the view of this delegation, the scope of the agreement therefore had to be consistent with what the Preamble of the PTBT seeks to achieve and to ensure that the majority of nations are not denied the full benefits of technological advancement in the nuclear field while a handful of States were left free to do so. The aim of a CTBT, and consequently, its scope had to be to prevent the testing of nuclear weapons and thereby to inhibit, in a non-discriminatory way, proliferation of nuclear weapons in their horizontal as well as vertical dimension. It could not be envisaged as an instrument designed to curtail technological progress or to perpetuate the division of the world into two categories of nations. In the promotion of the achievement of a nuclear test ban, the interests of the nuclear weapon States had to be taken into account on a basis of complete equality with the interests of the non-nuclear weapon States. This delegation stated that it had submitted a Working Paper entitled "New Technologies and Qualitative Arms Race" at the 3rd session of the United Nations General Assembly in 1988 containing a description of the emerging technologies including new "third generation" nuclear weapons. The development of these weapons could be effectively impeded by achieving a comprehensive test ban treaty which aimed at the general and complete cessation of testing of nuclear weapons by all States in all environments for all time. To be truly effective, such a treaty had to be non-discriminatory and had to be universally observed.

22. The Group of 21 stated that the international community has recognised that the question relating to verification and compliance can only be considered in tandem with other aspects of a treaty and referred to paragraph 31 of the Final Document of SSOD I which states that the form and modalities of the verification to be provided in any agreement depends upon and should be determined by the purpose, scope and nature of the agreement. In their view, the treaty on a nuclear test ban should be equitable and non-discriminatory so as to attract universal adherence and should include a verification system that is universal in its application, non-discriminatory in character and guarantees equal access to all States. Many delegations reiterated that the question of verification of a nuclear test ban was political not technical in nature and that appropriate verification methods were at hand. The view was expressed that national technical means of verification coupled with the proposed international exchange of seismic data would be adequate for monitoring a future treaty. It was pointed out that the trilateral negotiators' joint report to the Committee on Disarmament in 1980 had made it clear that definite progress has been made on the question of verification and compliance of a treaty in that all the three parties had agreed to use national technical means for verification and there was an agreement on on-site inspections on a voluntary basis.

23. A Group of Western States stressed that current seismic monitoring techniques cannot detect a range of military significant testing at the low end of the spectrum, and pointed out the need for further development of nuclear test ban monitoring systems and their capability and reliability. It was also pointed out that consideration should be given to the development and implementation of new monitoring technologies. One delegation within this group recalled its proposal for the establishment, testing and further development of a global seismic network as an important means of verifying compliance with a comprehensive test ban treaty.

24. Some delegations stressed again the need for a step-by-step approach that would allow a gradual refinement of a multilateral system in accordance with the experience gained during the establishment and adoption of parts of the system because of pertinent developments in science and technology.

25. Several delegations called for greater transparency by those States conducting nuclear tests in the provision of information and data on their nuclear testing.

26. Delegations shared the view that one of the basic elements of an effective multilateral verification system was seismic monitoring. In that regard, much support was expressed for the work of the Ad Hoc Group of Scientific Experts. Some delegations suggested that the Ad Hoc Committee could consider ways to give guidance to the work of the Ad Hoc Group. One delegation reiterated its proposal to expand the mandate of that Group to include other means of verification besides seismic monitoring.

27. Upon invitation by the Committee, the Chairman of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, its Scientific Secretary and the Coordinator of the Group's Second Technical Test (GSETT-2) reported to the Ad Hoc Committee at its third meeting on 6 August 1990, on the status of the Group's

activities. Discussions revolved around such questions as the reliability of the global seismic data exchange network being elaborated by the Ad Hoc Group; its detection and identification capability: the need to expand participation in the testing of the system currently underway.

28. Several delegations suggested that, in addition to seismic monitoring, the possibility should be considered of reinforcing a multilateral verification system for the monitoring of a nuclear test ban to include: atmospheric radioactivity surveillance; satellite remote sensing; and on-site inspection. They maintained that a consideration of these various components in their inter-relationship could greatly enhance the reliability of any future verification system.

29. Many delegations suggested that the Ad Hoc Committee bear in mind the practical work accomplished on nuclear testing verification issues in the context of the bilateral USSR/United States Nuclear Testing Talks (NTT). They welcomed the signing by the USSR and United States of the protocols to the Threshold Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of 1976. The chief negotiators of the NTT, Ambassador Palenykh of the USSR and Ambassador Robinson of the United States, addressed the Ad Hoc Committee at its fourth meeting on 9 August 1990, on the verification methods used in those two protocols, namely, hydro-dynamic yield measurement, on-site inspections and in-country seismic monitoring. Discussions revolved mainly around the applicability of those methods to verification of a multilateral treaty. The Ad Hoc Committee expressed appreciation for the visit of the Soviet and United States negotiators. It was the overall view that the Ad Hoc Committee's consideration of verification questions benefited from the above exchange and that this form of exchange of information could be useful in future consideration as well.

30. It was suggested that future consideration of the question of institutional and administrative arrangements could include methods of consultation and cooperation as well as appropriate organs, their composition and functions. Consideration could also be given to questions of financial aspects related to a verification system.

31. With respect to the parallel consultations under the guidance of the Chair on a programme of work for future consideration, the Chairman announced that several proposals had been put forward. The Chair pointed out that, although these proposals contained common elements based on the existing mandate, points of divergence had to be narrowed and that the remaining amount of time was not sufficient to produce the programme of work before the end of the session. The Chair also expressed his hope that the useful exchange of the views held this time would be taken into account in the future. It was suggested that members of the Ad Hoc Committee continue to discuss the subject during the intersessional period of the Conference on Disarmament and that, if necessary, parallel consultations on a programme of work could continue when the Ad Hoc Committee is re-established.

IV. CONCLUSIONS AND RECOMMENDATIONS

32. The Ad Hoc Committee agreed that, given the short time at its disposal, it had carried out a preliminary examination of specific and inter-related test ban issues. Bearing in mind the long awaited agreement on the re-establishment of the Ad Hoc Committee, it was recognized that these initial discussions were useful in preparing the ground for further consideration of the issue.

33. The Ad Hoc Committee noted with appreciation the work of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events. Its second technical test (GSETT-2) was considered to be of particular importance and it was recommended that more States participate in the test. The participation of the officials of the Ad Hoc Group in the work of the Committee was appreciated and it was generally felt that the Ad Hoc Committee should continue the practice of meeting with experts of the Ad Hoc Group.

34. It was agreed that substantive work on agenda item 1 should continue at the 1991 session of the Conference and that, accordingly, it would be appropriate to re-establish the Ad Hoc Committee, in accordance with recently established procedures.

In the absence of consensus on a specific time frame, the Group of 21 and many other delegations stated that the Ad Hoc Committee should be re-established at the beginning of the 1991 session.

1991

CONFERENCE ON DISARMAMENT

CD/1045
17 January 1991

Original: ENGLISH
(EXTRACT)

LETTER DATED 14 JANUARY 1991 FROM THE SECRETARY-GENERAL OF THE UNITED NATIONS TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE RESOLUTIONS AND DECISIONS ON DISARMAMENT ADOPTED BY THE GENERAL ASSEMBLY AT ITS FORTY-FIFTH SESSION

I have the honour to transmit herewith the texts of the resolutions adopted by the General Assembly at its forty-fifth session, which entrust specific responsibilities to the Conference on Disarmament in 1991. The relevant provisions of those resolutions are reproduced in the Annex.

For the information of the Conference, I also have the honour to transmit herewith other resolutions and decisions, dealing with or related to disarmament matters, adopted by the General Assembly at its forty-fifth session.

(Signed) Javier Pérez de Cuéllar

The Conference's attention should be drawn, in particular, to the following provisions contained in those resolutions:

(1) In resolution 45/49, operative paragraph 5 appeals to all States members of the Conference on Disarmament to promote the re-establishment by the Conference at the beginning of its 1991 session of the Ad Hoc Committee on a Nuclear Test Ban with the objective of carrying out the multilateral negotiation of a treaty on the complete cessation of nuclear-test explosions; and operative paragraph 6 recommends to the Conference on Disarmament that such an ad hoc committee should comprise two working groups dealing, respectively, with the following interrelated questions: contents and scope of the treaty, and compliance and verification.

(2) In resolution 45/51, operative paragraph 2 urges the Conference on Disarmament, in order that a comprehensive nuclear test-ban treaty may be concluded at an early date, to re-establish the Ad Hoc Committee on a Nuclear Test Ban at the beginning of its 1991 session to carry forward the work begun in the Conference in 1990, focusing on substantive work on specific and interrelated test-ban issues, including structure and scope as well as verification and compliance; operative paragraph 3 also urges the Conference on Disarmament: (a) To take into account, in this context, the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, including work on the routine exchange and use of wave-form data, and other relevant initiatives or experiments by individual States and groups of States; (b) To encourage the widest possible participation by States in the technical test that is now under way concerning the global exchange and analysis of seismic data; (c) To take immediate steps for the establishment, with the widest possible participation, of an international seismic monitoring network with a view to developing further a system for the effective monitoring and verification of compliance with a comprehensive nuclear test-ban treaty; (d) To initiate detailed investigation of other measures to monitor and verify compliance with such a treaty, including on-site inspections and an international network to monitor atmospheric radioactivity; operative paragraph 4 urges: (a) The nuclear-weapon States, especially those which possess the most important nuclear arsenals, to agree promptly to appropriate verifiable and militarily significant interim measures, with a view to concluding a comprehensive nuclear test-ban treaty; (b) those nuclear-weapon States which have not yet done so to adhere to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water; operative paragraph 5 calls upon the Conference on Disarmament to report to the General Assembly at its forty-sixth session on progress made.



General Assembly

Distr.
GENERAL

A/RES/45/49
10 December 1990

Forty-fifth session
Agenda item 46

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/45/760)]

45/49. Cessation of all nuclear-test explosions

The General Assembly,

Wearing in mind the highest priority which, in the sphere of disarmament, it has repeatedly assigned to the attainment of the complete cessation of nuclear-weapon tests,

Recalling that for over thirty years it has been examining this question, on which it has adopted more than seventy resolutions,

Taking into account the undertakings by the three depositary States of the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water 1/ to seek to achieve the early discontinuance of all test explosions of nuclear weapons for all time, as well as the reiteration of this commitment in the Treaty on Non-Proliferation of Nuclear Weapons. 2/

Recalling that the Secretary-General, addressing a plenary meeting of the General Assembly on 12 December 1984, after appealing for a renewed effort towards a comprehensive test-ban treaty, emphasized that no single multilateral agreement could have a greater effect on limiting the further refinement of nuclear weapons

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ Ibid., vol. 729, No. 10485.

and that a comprehensive test-ban treaty is the litmus test of the real willingness to pursue nuclear disarmament, 3/

Recalling also that the leaders of the States associated with the Six-Nation Initiative on peace and disarmament affirmed in the Stockholm Declaration, adopted on 21 January 1988, 4/ that "Any agreement that leaves room for continued testing would not be acceptable",

Recalling further the final document on international security and disarmament adopted by the Ninth Conference of Heads of State or Government of Non-Aligned Countries, held at Belgrade from 4 to 7 September 1989, 5/ which underlined that the immediate suspension of and comprehensive ban on nuclear tests remained one of the highest priorities of nuclear disarmament,

Taking note with satisfaction of the continuing progress made in the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events on the seismic verification of a comprehensive test ban,

Taking note of the re-establishment, without a negotiating mandate, of the Ad Hoc Committee on a Nuclear Test Ban by the Conference on Disarmament at its summer session in 1990,

1. Reiterates once again its grave concern that nuclear testing continues unabated, against the wishes of the overwhelming majority of Member States;
2. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States for all time is a matter of the highest priority;
3. Reaffirms also its conviction that such a treaty would constitute a contribution of the utmost importance to the cessation of the nuclear-arms race;
4. Urges once more all nuclear-weapon States, in particular the three depositary States of the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water and of the Treaty on the Non-Proliferation of Nuclear Weapons, to seek to achieve the early discontinuance of all test explosions of nuclear weapons for all time and to expedite negotiations to this end;

3/ See Official Records of the General Assembly, Thirty-ninth Session, Plenary Meetings, 97th meeting, para. 302.

4/ A/43/125-S/19478, annex.

5/ See A/44/551-S/20870, annex.

5. Appeals to all States members of the Conference on Disarmament to promote the re-establishment by the Conference at the beginning of its 1991 session of the Ad Hoc Committee on a Nuclear Test Ban with the objective of carrying out the multilateral negotiation of a treaty on the complete cessation of nuclear-test explosions;

6. Recommends to the Conference on Disarmament that the Ad Hoc Committee should comprise two working groups dealing, respectively, with the following interrelated questions: contents and scope of the treaty, and compliance and verification;

7. Decides to include in the provisional agenda of its forty-sixth session the item entitled "Cessation of all nuclear-test explosions".

54th plenary meeting
4 December 1990



General Assembly

Distr.
GENERAL

A/RES/45/50
13 December 1990

Forty-fifth session
Agenda item 47

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/45/769)]

45/50. Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water

The General Assembly,

Recalling its resolution 44/106 of 15 December 1989,

Reiterating its conviction that a comprehensive nuclear-test-ban treaty is the highest-priority measure for the cessation of the nuclear arms race and for the achievement of the objective of nuclear disarmament,

Recalling also its resolution 1910 (XVIII) of 27 November 1963, in which it noted with approval the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, 1/ signed on 5 August 1963, and requested the Conference of the Eighteen-Nation Committee on Disarmament 2/ to continue with a sense of urgency its negotiations to achieve the objectives set forth in the preamble to the Treaty,

Recalling further that more than one third of the parties to the Treaty have requested the Depositary Governments to convene a conference to consider an amendment that would convert the Treaty into a comprehensive test-ban treaty,

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ The Committee on Disarmament was redesignated the Conference on Disarmament as from 7 February 1984.

Reiterating also its conviction that such a conference will facilitate the attainment of the objectives set forth in the Treaty and thus serve to strengthen it,

Noting with satisfaction that the meeting for the organization of the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water was held in New York from 29 May to 8 June 1990, and taking note of the report of that meeting, 3/

1. Notes with satisfaction that the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water will be held in New York from 7 to 18 January 1991;
2. Calls upon all parties to the Treaty to participate in, and to contribute to the success of, the Amendment Conference for the achievement of a comprehensive nuclear-test ban at an early date, as an indispensable measure towards implementation of their undertakings in the preamble to the Treaty;
3. Reiterates its conviction that, pending the conclusion of a comprehensive nuclear-test-ban treaty, the nuclear-weapon States should suspend all nuclear-test explosions through an agreed moratorium or unilateral moratoria;
4. Recommends that arrangements be made to ensure that intensive efforts continue, under the auspices of the Amendment Conference, until a comprehensive nuclear-test-ban treaty is achieved;
5. Recommends also that the Amendment Conference establish a working group, or other means it deems appropriate, to study, inter alia, the organization of control, institutional mechanisms and legal aspects of a comprehensive nuclear-test-ban treaty and to report its conclusions to the Conference;
6. Stresses the importance of ensuring adequate co-ordination among the various negotiating forums dealing with a comprehensive nuclear-test-ban treaty;
7. Decides to include in the provisional agenda of its forty-sixth session the item entitled "Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water".

54th plenary meeting
4 December 1990



General Assembly

Distr.
GENERAL

A/RES/45/51
18 December 1990

Forty-fifth session
Agenda item 48

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/45/770)]

45/51. Urgent need for a comprehensive nuclear-test-ban treaty

The General Assembly,

Convinced that a nuclear war cannot be won and must never be fought,

Convinced also of the consequent urgent need for an end to the nuclear-arms race and the immediate and verifiable reduction and ultimate elimination of nuclear weapons,

Convinced further that an end to nuclear testing by all States in all environments for all time is an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation and to contribute, along with other concurrent efforts to reduce nuclear arms, to the eventual elimination of nuclear weapons,

Noting concerns expressed about the environmental and health risks associated with underground nuclear testing,

Recognizing the agreement on and signature of, in Washington on 1 June 1990, the verification protocols to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, ^{1/} signed on 3 July 1974, and to the Treaty between the United States

^{1/} Official Records of the General Assembly, Twenty-ninth Session, Supplement No. 27 (A/9627), annex II, document CCD/431.

of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, 2/ signed on 28 May 1976, and looking forward to the conclusion of all ratification processes,

Welcoming the ongoing implementation of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of Their Intermediate-Range and Shorter-Range Missiles 3/ and the agreement in principle on and further progress made towards a first treaty on significant reductions in their strategic nuclear forces, and urging the earliest possible conclusion of such a treaty,

Recalling the final document on international security and disarmament adopted by the Ninth Conference of Heads of State or Government of Non-Aligned Countries, held at Belgrade from 4 to 7 September 1989, 4/

Recalling also the proposals by the leaders of the Six-Nation Initiative 5/ to promote an end to nuclear testing,

Convinced that the most effective way to achieve the discontinuance of all nuclear tests by all States in all environments for all time is through the conclusion, at an early date, of a verifiable, comprehensive nuclear-test-ban treaty that will attract the adherence of all States,

Reaffirming the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty, and in this context welcoming the re-establishment of the Ad Hoc Committee on a Nuclear Test Ban in the Conference on Disarmament,

2/ The United Nations Disarmament Yearbook, vol. I: 1976 (United Nations publication, Sales No. E.77.IX.2), appendix III.

3/ Ibid., vol. 12: 1987 (United Nations publication, Sales No. E.88.IX.2), appendix VII.

4/ See A/44/551-S/20870, annex.

5/ See the Joint Declaration issued on 22 May 1984 by the heads of State or Government of Argentina, Greece, India, Mexico, Sweden and the United Republic of Tanzania (A/39/277-S/16587, annex; for the printed text, see Official Records of the Security Council, Thirty-ninth Year, Supplement for April, May and June 1984, document S/16587, annex), reaffirmed in the Delhi Declaration issued on 28 January 1985 (A/40/114-S/16921, annex; for the printed text, see Official Records of the Security Council, Fortieth Year, Supplement for January, February and March 1985, document S/16921, annex), the Mexico Declaration issued on 7 August 1986 (A/41/518-S/18277, annex I), the Stockholm Declaration issued on 21 January 1988 (A/43/125-S/19478, annex) and the Declaration issued on 22 May 1989 on the occasion of the fifth anniversary of the launching of the Six-Nation Initiative (A/44/318-S/20689, annex).

Taking note of the work being undertaken within the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events and the conduct of the second technical test concerning the global exchange and analysis of seismic data, 6/

Noting that the Amendment Conference of States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water will be held in January 1991 to consider an amendment to extend the scope of the Treaty to include underground nuclear testing,

1. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States in all environments for all time is a matter of fundamental importance;

2. Urges the Conference on Disarmament, in order that a comprehensive nuclear-test-ban treaty may be concluded at an early date, to re-establish the Ad Hoc Committee on a Nuclear Test Ban at the beginning of its 1991 session to carry forward the work begun in the Conference in 1990, focusing on substantive work on specific and interrelated test-ban issues, including structure and scope as well as verification and compliance;

3. Also urges the Conference on Disarmament:

(a) To take into account, in this context, the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, including work on the routine exchange and use of wave-form data, and other relevant initiatives or experiments by individual States and groups of States;

(b) To encourage the widest possible participation by States in the technical test that is now under way concerning the global exchange and analysis of seismic data;

(c) To take immediate steps for the establishment, with the widest possible participation, of an international seismic monitoring network with a view to developing further a system for the effective monitoring and verification of compliance with a comprehensive nuclear-test-ban treaty;

(d) To initiate detailed investigation of other measures to monitor and verify compliance with such a treaty, including on-site inspections and an international network to monitor atmospheric radioactivity;

4. Urges:

(a) The nuclear-weapon States, especially those which possess the most important nuclear arsenals, to agree promptly to appropriate verifiable and

6/ See Official Records of the General Assembly, Forty-fifth Session, Supplement No. 27 (A/45/27), para. 29.

militarily significant interim measures, with a view to concluding a comprehensive nuclear-test-ban treaty;

(b) Those nuclear-weapon States which have not yet done so to adhere to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water; ^{7/}

5. Calls upon the Conference on Disarmament to report to the General Assembly at its forty-sixth session on progress made;

6. Decides to include in the provisional agenda of its forty-sixth session the item entitled "Urgent need for a comprehensive nuclear-test-ban treaty".

54th plenary meeting
4 December 1990

^{7/} United Nations, Treaty Series, vol. 480, No. 6964.

CONFERENCE ON DISARMAMENT

CD/1054
4 February 1991

Original: ENGLISH

LETTER DATED 4 FEBRUARY 1991 FROM THE REPRESENTATIVES OF INDONESIA, MEXICO, PERU, VENEZUELA, YUGOSLAVIA AND SRI LANKA ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING DRAFT PROTOCOL II OF AMENDMENT TO THE TREATY BANNING NUCLEAR WEAPON TESTS IN THE ATMOSPHERE, IN OUTER SPACE AND UNDER WATER

We have the honour to refer to our letter of 5 August 1988 containing our proposal (document CD/852) to amend the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water. During the first phase of the Amendment Conference, held in New York from 7 to 18 January of this year, our six countries, co-authors of the initiative to amend the Treaty, submitted for consideration of the Parties a draft Protocol II on verification of our proposed amendment.

During the discussion, it was suggested that, without prejudice to the decision taken by the Amendment Conference, the draft Protocol II be considered also by the Conference on Disarmament. We therefore request you that it be distributed as an official document of the Conference on Disarmament and made available to the Ad Hoc Committee on a Nuclear Test Ban for further consideration.

Finally, in view of the important contribution made in this regard by the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, we request you that this document be made available to that Group so as to enable it to examine the relevant aspects of draft Protocol II.

(Signed) Wisber Loeis
Ambassador
Delegation of Indonesia to
the Conference on Disarmament

(Signed) Miguel Marin
Ambassador
Delegation of Mexico to
the Conference on Disarmament

(Signed) Oswaldo de Rivero
Ambassador
Delegation of Peru to
the Conference on Disarmament

(Signed) Horacio Arteaga
Ambassador
Delegation of Venezuela to
the Conference on Disarmament

(Signed) Naste Calovski
Ambassador
Delegation of Yugoslavia to
the Conference on Disarmament

(Signed) Siripala Palihakkara
First Secretary
Delegation of Sri Lanka to
the Conference on Disarmament

DRAFT PROTOCOL II OF AMENDMENT TO THE TREATY BANNING NUCLEAR WEAPON
TESTS IN THE ATMOSPHERE, IN OUTER SPACE AND UNDER WATER

<u>Outline of Protocol II</u>	<u>Page</u>
Preamble	4
Part I: Treaty institutions	
Article I: The Organization	5
Article II: The Assembly	5
Article III: The Secretariat	6
Part II: Operating procedure	
Article IV: Monitoring techniques	7
Article V: Reports	8
Part III: Obligations of the Parties	
Article VI: Co-operative measures	8
Article VII: Additional monitoring procedures	9
Part IV: Final provisions	
Article VIII: Annexes	9
Annex 1: Permanent global monitoring network	
Article I: Monitoring stations	11
Article II: Station operations	11
Article III: Site selection	12
Annex 2: Temporary localized monitoring	
Article I: Initiation of local monitoring	12
Article II: Station equipment and operations	13
Article III: Site selection	13
Annex 3: On-site inspection	
Article I: Initiation of on-site inspection	14
Article II: Conduct of on-site inspection	15
Annex 4: National data provided to the Secretariat	16
Appendix 1: Stations of permanent global monitoring network	

PROTOCOL II

PREAMBLE

Pursuant to and in implementation of the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water, as amended, hereinafter referred to as the Treaty, the Parties hereby agree upon the following measures to assist in the verification of compliance with the obligations assumed.

Part I: Treaty institutions

Article I. The Organization

1. The Parties hereby establish an Organization for the purpose of assisting in the verification of compliance with the Treaty.
2. The Organization shall compile information and make observations pertinent to the Treaty, and shall report the information and observations to each Party to the Treaty.
3. Each Party shall co-operate fully with the Organization.
4. The principal organs of the Organization shall be the Assembly and the Secretariat.
5. Costs of the Organization shall be borne by the Parties in the same ratio as established by the annual assessment of United Nations dues, unless the Assembly, by a majority of two thirds, establishes a different schedule of charges.
6. The Organization shall enjoy in the territory of each Party the legal capacity and the privileges and immunities appropriate for the exercise of its functions. Representatives of the Organization and Parties' representatives to the Organization shall enjoy the privileges and immunities appropriate for the exercise of their functions.

Article II. The Assembly

1. Each Party shall be a member of the Assembly.
2. The Assembly shall meet at least once annually, and shall also meet whenever requested by the Secretary-General or by at least one tenth of the Parties.
3. The Assembly shall approve or modify the budget of the Organization.
4. The Assembly shall establish the policies and practices of the Organization.
5. The Assembly shall elect the Secretary-General for a five-year term.
6. The Assembly shall create a Technical Committee to assist in its work.
 - (a) Each member of the Assembly shall have the right to designate a representative to the Technical Committee.
 - (b) The Technical Committee shall review the technical operations of the Secretariat, assess the Secretariat's reports and recommendations, evaluate the performance of the Secretariat, and make recommendations to the Assembly regarding possible revision of the verification measures with a view to enhancing their effectiveness or reducing their cost.
 - (c) The Technical Committee shall meet at least four times per year.

(d) The Technical Committee shall be organized into Sub-Committees, with each Sub-Committee having principal responsibility for one branch or verification technology or means of Treaty verification.

7. The Assembly shall approve, modify or reject the recommendations of the Technical Committee and shall determine whether to alter the Organization's procedures.

8. Each Party shall have one vote in the Assembly. All decisions shall be taken by a majority of those voting, unless the Assembly, by a majority of two thirds, approves a different standard. The Assembly shall adopt its own rules of procedure.

Article III. The Secretariat

1. The Secretariat shall implement the verification measures contained in this Protocol and the additional measures that may be approved by the Assembly.

2. The Secretariat shall be headed by a Secretary-General.

3. The Secretariat shall have appropriate staff and resources to carry out the daily functions of the Organization, to compile and maintain the data gathered and received by the Organization, and to make observations pertinent to the Treaty.

4. The paramount consideration in the employment of the staff and in the determination of the conditions of service shall be the necessity of securing the highest standards of efficiency, competence, and integrity. Due regard shall be paid to the importance of recruiting the staff on as wide a geographical basis as possible.

5. In the performance of their duties, the Secretariat and the staff shall not seek or receive instructions from any Government or from any other authority external to the Organization. They shall refrain from any action which might reflect upon their position as international officials responsible only to the Organization. Each Party undertakes to respect the exclusively international character of the responsibilities of the Secretariat and staff and not to seek to influence them in the discharge of their responsibilities.

6. The Secretariat shall present an annual report to the Assembly and periodic reports to the Technical Committee.

7. The Secretariat shall prepare a proposed budget for approval by the Assembly.

8. The Secretariat shall designate appropriate senior staff officials to provide expert assistance to the Technical Committee.

9. The Secretariat shall establish the following Sections responsible for implementing verification measures pertinent to the prohibition of nuclear explosions in various environments:

(a) Section A, in the atmosphere;

- (b) Section B, in outer space;
- (c) Section C, under water; and
- (d) Section D, under ground.

The Secretariat may establish other Sections and offices, as appropriate.

10. Each Section of the Secretariat shall develop a working description of the phenomena associated with nuclear explosions in each environment, which are observable by global monitoring networks, by localized monitoring, by on-site inspections or by other means. Each Section shall compile a data set recording every actual observation of such phenomena, together with a summary of available technical and other data regarding them.

11. Each Section of the Secretariat shall compile similar working descriptions of other phenomena associated with natural and legitimate events, activities and conditions that might create ambiguity or uncertainty regarding Treaty compliance, which are observable by global monitoring networks, by localized monitoring, by on-site inspections or by other means. Each section shall compile a data set recording every actual observation of such phenomena, together with a summary of available technical and other data regarding them.

12. The Secretariat shall compile a registry of reports submitted by the Parties regarding their planned or completed activities that might generate the phenomena described in paragraphs 10 and 11.

Part II: Operating procedures

Article IV. Monitoring techniques

1. The Secretariat shall establish permanent global monitoring networks, as specified in annex 1.
2. The Secretariat shall consider and, as appropriate, shall implement temporary, localized monitoring, as specified in annex 2.
3. The Secretariat shall consider and, as appropriate, shall implement on-site inspections, as specified in annex 3.
4. The Secretariat shall consider and, as appropriate, shall implement inspections to corroborate the information reported to it by the Parties, as specified in annex 4.
5. The Secretariat shall undertake research related to the Treaty. Parties shall co-operate with the Secretariat in the design, conduct and analysis of research projects that could contribute to the improvement of the technology of verification.
6. The Secretariat shall investigate the feasibility of establishing additional monitoring stations or equipment, including satellite-based or aircraft-based systems, and of obtaining prompt access to relevant data collected by individual States. States shall co-operate to the maximum extent possible in providing relevant data.

Article V. Reports

1. Each section of the Secretariat shall report monthly regarding:
 - (a) Additions and changes to the working descriptions, data sets, and registries it compiles;
 - (b) Observations it makes through permanent global monitoring networks, temporary localized monitoring, on-site inspections, and other means; and
 - (c) Decisions it makes regarding the application of various monitoring mechanisms and the corroboration of information supplied to it by Parties.
2. Each section of the Secretariat shall report immediately whenever, in the exercise of its functions, it detects evidence related to a possible violation of the Treaty.
3. Each Section report shall be provided to each Party and to each representative on the Technical Committee.
4. The Technical Committee shall review the reports and make recommendations to the Assembly.

Part III: Obligations of the Parties

Article VI. Co-operative measures

1. Each Party shall permit the establishment and operation on its territory of permanent global monitoring networks as specified in annex 1.
2. Each Party shall permit the establishment and operation on its territory of temporary localized monitoring as specified in annex 2.
3. Each Party shall permit on-site inspection of its territory and activities, as specified in annex 3.
4. Each Party shall provide information to the Secretariat, and shall permit the Secretariat to corroborate such information, as specified in annex 4.
5. Each Party shall assist the Secretariat in conducting monitoring activities in areas outside the jurisdiction of any Party. Each Party shall promptly provide equipment, personnel and other support requested by the Secretariat for the conduct of such operations.
6. Each Party shall co-operate fully and in a timely fashion with the Secretariat's requests for information, support or other assistance in conducting the verification procedures of this Protocol.
7. Each Party shall designate a competent national organization for the purpose of serving as liaison with the Secretariat, providing the required information, and responding to requests for assistance.

Article VII. Additional monitoring procedures

1. For the purpose of providing assurance of compliance with the provisions of the Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Parties operating in accordance with paragraph 1 of this article.

3. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with the provisions of the Treaty.

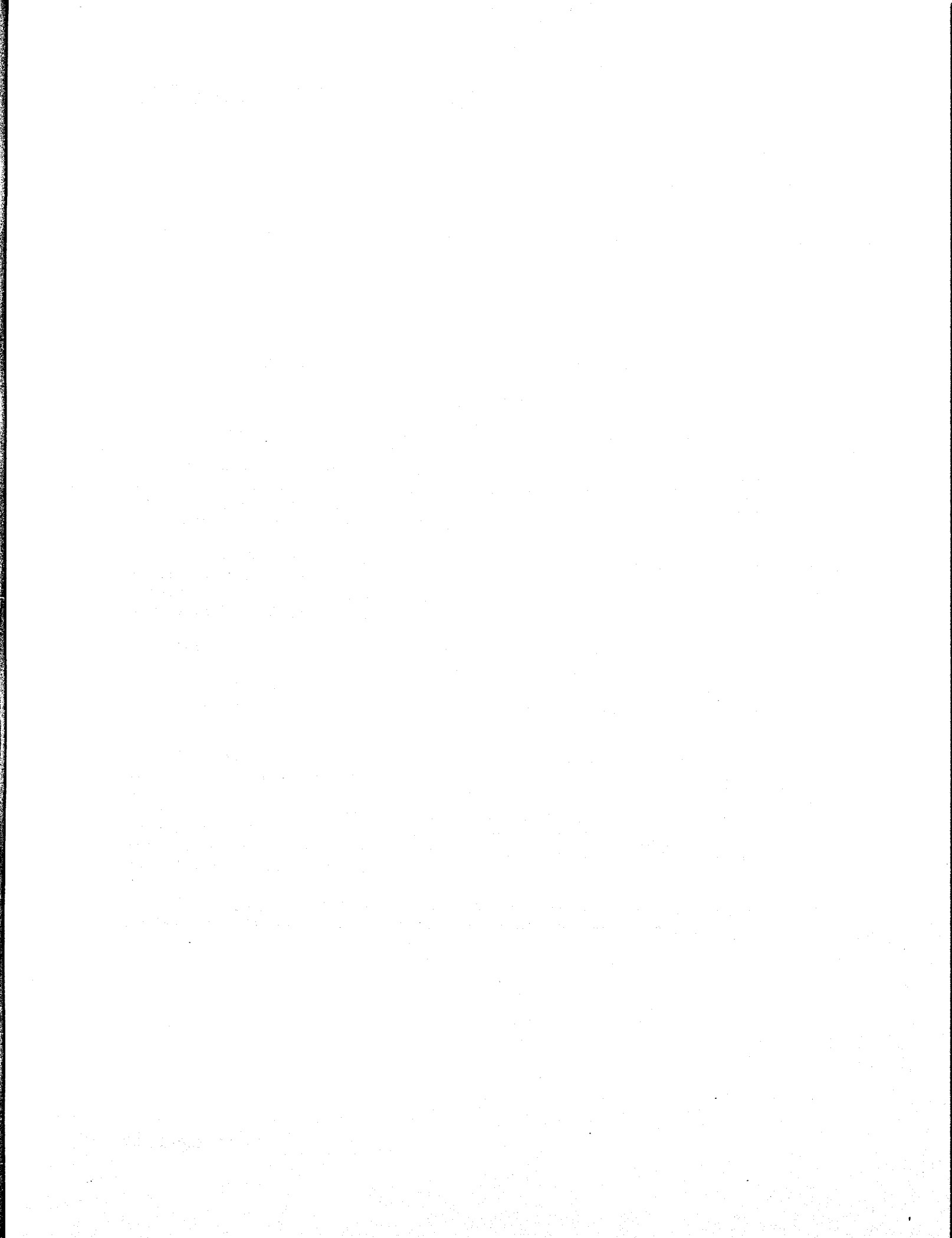
4. Two or more Parties may agree upon additional arrangements for the purpose of enhancing confidence in compliance with the Treaty, to be effective only among themselves, provided that those arrangements do not in any way interfere with the operations of the Organization.

5. If a multilateral verification system is established within the framework of the United Nations, the Organization shall determine the appropriate relationship between the current Treaty structures and the new agency or institutions thereby created.

Part IV: Final provisions

Article VIII. Annexes

The Annexes and Appendices shall be integral parts of this Protocol.



Annex 1: Permanent global monitoring network

Article I. Monitoring stations

1. The permanent global monitoring network shall initially include stations as indicated in appendix 1. Thereafter, additional stations may be added, as the Assembly or Secretariat determines to be necessary.

2. The Secretariat shall determine what types of monitoring equipment shall be emplaced at each station. As appropriate, the Secretariat may designate sensors capable of performing seismic monitoring, radioisotope air and precipitation sampling, ionospheric disturbance active sensing, outer space monitoring, and other monitoring functions approved by the Assembly.

3. The equipment included in the stations shall be of the best available quality and reliability, as determined by the Secretariat. The Secretariat may upgrade the equipment at the stations as improved equipment becomes available and financially feasible.

4. The network shall have at least the reliable capability to detect, locate and identify a tamped explosion of 500 tons or more of TNT equivalent anywhere in the world and of 5 tons or more of TNT equivalent within the limits of national jurisdiction of any State which has conducted more than one nuclear explosion.

5. The network shall have the capability to detect the release of significant quantities of relevant radioisotopes anywhere in the world.

6. The Secretariat shall procure the equipment for the stations. Any Party may donate stations or equipment to the global network.

7. The Secretariat shall field test the operation of the global monitoring network, assessing the accuracy and sensitivity of the equipment. Each Party shall co-operate in the conduct and evaluation of these tests.

Article II. Station operations

1. Each Party shall operate and maintain all stations on its territory. The Secretariat shall operate and maintain all stations not based on the territory of a Party.

2. The Secretariat shall train the personnel who operate and maintain the stations.

3. The Secretariat shall have immediate access to the stations and equipment at all times. The Secretariat shall inspect the stations and equipment to ensure appropriate operation and maintenance.

4. If the Secretariat finds that the host State is unable to operate and maintain a station appropriately, the Secretariat shall perform the operation and maintenance functions until the host State is able to do so.

5. Each station shall transmit its acquired data to the Secretariat headquarters in real time through a high-quality satellite-based data system

designated by the Secretariat. Data shall be transmitted in unencrypted form, and a secure authentication procedure shall be implemented to reveal any tampering or degradation in the quality of the data stream.

6. All data transmitted to the Secretariat shall be promptly available to all Parties.

7. Each station and its equipment shall be tamper-resistant and tamper-indicating.

8. Each station shall be equipped with back-up sensors, recording equipment, power supplies and other items as directed by the Secretariat.

Article III. Site selection

1. The Secretariat shall designate a large area (approximately 200 square kilometres) within which the permanent global monitoring station shall be located.

2. The host State shall then designate five small areas (each approximately 10 square kilometres) within the large area.

3. The Secretariat shall then designate one of the five small areas for establishment of the station. The Secretariat shall then select the specific site for the station, after consultation with the host State.

4. Areas and sites shall be selected based upon their suitability for performing the missions of the station. Sites shall be seismically quiet and shall if possible provide access to bed-rock.

5. Similar procedures shall apply to the relocation of a station that the Secretariat has found to be inadequate or inappropriate, and to the addition of supplementary stations to the global network.

6. The host State shall construct the station and install the equipment at the direction and under the supervision of the Secretariat.

Annex 2: Temporary localized monitoring

Article I. Initiation of local monitoring

1. The Secretariat may decide to undertake temporary localized monitoring whenever:

(a) There have been two or more events in an area for which the data acquired by the global monitoring network did not fit some elements of the Secretariat's working description of a natural or legitimate event, activity or condition;

(b) There have been one or more events in the area for which the data acquired by the global monitoring network did fit some elements of the Secretariat's working description of a nuclear explosion;

(c) There has been an on-site inspection in the area, and additional information-gathering would help confirm the nature of the ambiguous event or events; or

(d) The Secretariat otherwise determines that confidence in compliance with the Treaty would be enhanced by operation of additional localized monitoring.

2. The purposes of the temporary localized monitoring shall be to clarify an ambiguous situation, to supplement the data provided by the global network, and to demonstrate the good faith compliance of all Parties to the Treaty.

Article II. Station equipment and operations

1. The Secretariat shall determine what types of localized monitoring shall be undertaken, what equipment shall be utilized, where the equipment shall be emplaced, what the capabilities and sensitivities of the equipment shall be, and what local stations shall be constructed to support the operations. Equipment may be similar to that operated at the global network, and additional types of equipment may be installed and operated as appropriate.

2. The Secretariat shall procure, install, operate, and maintain the equipment and the station. If the Secretariat determines that construction or modification of local buildings is necessary, the host State shall perform those services at the direction and under the supervision of the Secretariat. If the Secretariat determines that the station should be operated for a sustained period of time, the Secretariat may delegate the operation and maintenance to the host State, under terms similar to those applicable to the operation of the permanent global monitoring network stations.

3. Data from the temporary stations shall be duplicated on the site and a copy provided to the host State. Data shall be transmitted promptly and securely to the Secretariat headquarters.

4. Procedures for ensuring that the data are authentic and secure shall be similar to those adopted for the permanent global monitoring network.

5. When the Secretariat determines that localized monitoring is no longer necessary, the station may be dismantled or the host State may elect to maintain its operations or convert it to other purposes. Any equipment supplied by the Secretariat shall be returned to it.

Article III. Site selection

1. The Secretariat shall designate a large area (approximately 20 square kilometres) within which the temporary localized monitoring station shall be located.

2. The host State shall then designate five small areas (each approximately 1 square kilometre) within that large area.

3. The Secretariat shall then designate one of the five small areas for establishment of the station. The Secretariat shall then select the specific site for the station, after consultation with the host State.

4. Areas and sites shall be selected based upon their ability to perform the missions of the station. Sites shall be seismically quiet and shall if possible provide access to bed-rock.

5. Similar procedures shall apply to the relocation of a station that the Secretariat has found to be inadequate or inappropriate.

Annex 3: On-site inspection

Article I. Initiation of on-site inspection

1. Any Party may submit to the Secretariat information that it believes may be relevant to compliance with the obligations of the Treaty and that may concern the necessity for conducting on-site inspection. Any Party may suggest that the Secretariat undertake an on-site inspection of the territory or activities of another Party.

2. The Secretariat shall consider all information submitted to it and shall promptly respond to all suggestions for on-site inspection. If the Secretariat decides not to undertake on-site inspection, it shall report its decision to the Assembly along with all other reports. If requested to do so by one fifth of the Parties to the Treaty, the Secretariat shall make a special report on the subject within 24 hours.

3. The Secretariat shall undertake on-site inspection, whether or not a Party has suggested it, whenever:

(a) Data from the global permanent monitoring network or the temporary localized monitoring indicate the occurrence of an event that does not conform entirely to the Secretariat's working description of a natural or legitimate event, activity or condition and that does conform at least in part to the working description of a nuclear explosion; and

(b) The data suggest that the energy released in the event is either:

(i) Over 1,000 tons of TNT equivalent yield, or

(ii) A smaller event for which the selection algorithm indicates that on-site inspection should be conducted.

4. The selection algorithm for smaller events shall rely upon probabilistic sampling such that the likelihood of on-site inspection is higher when:

(a) The event is larger;

(b) There are important respects in which the event does not conform to the working description of a natural or legitimate event, activity or condition;

(c) There are important respects in which the event does conform to the working description of a nuclear explosion;

(d) There have been other similar events in the area that have not been the subject of on-site inspection or temporary localized monitoring; and

(e) The event occurs on the territory of a State that has conducted more than one nuclear explosion.

5. If the Secretariat determines to undertake an on-site inspection, the host State may appeal the decision to the Assembly, which shall consider the matter immediately. The inspection shall proceed while the Assembly is considering the appeal. If the Assembly concludes by a two thirds vote that the on-site inspection is not warranted, then the on-site inspection shall be abandoned promptly.

6. The Secretariat may issue an order requiring the host State:

(a) To leave all, or specified, vehicles, buildings, personnel, equipment and other items in place in the inspection area; and

(b) To refrain from undertaking any, or specified, other changes in circumstances of the inspection area, pending the arrival of the inspection personnel.

7. The Secretariat shall provide the following information to the host State 24 hours prior to the scheduled arrival of the inspectors at the host State's point of entry:

(a) The point of entry to be used;

(b) The estimated time of arrival and means of arrival at the point of entry;

(c) The full names of the inspectors and the transport crew, each person's gender, date of birth, place of birth, and passport number;

(d) The location to be inspected.

8. The host State shall transport the inspectors from the point of entry to the location of the inspection within 24 hours after the inspectors' arrival at the point of entry.

Article II. Conduct of on-site inspection

1. The Secretariat shall determine the area to be inspected, the duration and dates of the inspection, and the size and composition of the inspection team. The Secretariat shall designate the individual members of the inspection team.

2. The host State shall provide the inspectors with immediate and uninhibited access to the entirety of the inspection area, and to all vehicles, buildings, personnel, equipment and other items within it. The host shall provide the inspectors with transportation to, from, and within the inspection area; with appropriate housing and sustenance during the inspection; with the best quality maps available of the inspection region; and with additional logistical and safety support as necessary.

3. The inspectors shall supply their own tools and equipment for use in the inspection. The host State may examine the tools and equipment in the presence of the inspectors at the start of the inspection, and all tools and equipment shall be kept in secure storage facilities while not in use.

4. Inspectors shall be entitled to gather information they consider relevant, including, but not limited to:

(a) Taking photographs with ordinary visible-light cameras and other equipment (including video equipment);

(b) Collecting samples of air, soil, water, flora, and fauna;

(c) Surveying the area via helicopter, fixed-wing aircraft, and suitable terrestrial vehicles;

(d) Digging holes for the emplacement of sensing equipment. The data acquired in the inspection shall be used exclusively for purposes of Treaty inspection.

5. The inspectors shall have the diplomatic privileges and immunities customarily accorded to persons of their status performing similar functions under other international agreements.

6. The inspection team shall enjoy prompt, secure communications with the Secretariat headquarters. The inspection team may elect to bring its own communications equipments or to rely upon that provided by the host State.

7. The host State may designate personnel to accompany the inspectors during the performance of their duties, including the gathering of information under paragraph 4 of this article, and to replicate their observations and measurements, provided that these personnel do not interfere with the expeditious and effective conduct of the inspection.

8. If the host State considers that particular aspects of the inspection are inappropriately infringing upon its sovereignty or rights, it may lodge a complaint with the Assembly, which shall consider the question promptly. Unless the Assembly determines otherwise, by a two-thirds vote, the Secretariat shall be authorized to continue with the questioned inspection procedures.

9. Before leaving the inspection area, the inspection team shall complete a brief written report summarizing its activities and the data it has collected. A copy of this report shall be provided to the host State before the team's departure. The host State may append a commentary, either at that time or subsequently.

10. The Secretariat may include public or journalistic members on the inspection team. The inspections will be further open to public and journalistic observation as the host State considers appropriate, provided that the observers do not inhibit the expeditious and effective conduct of the inspection.

Annex 4: National data provided to the Secretariat

1. Within one year after the entry into force of the Protocol, each Party shall provide to the Secretariat the following information regarding every nuclear explosion undertaken by it or within its national jurisdiction:

(a) The geographic co-ordinates and height or depth of the explosion;

(b) The nature of the surrounding medium and seismic transmission materials;

(c) The type, yield, nature, and purpose of the explosion;

(d) The date and time of the explosion.

2. Within one year after the entry into force of the Protocol, and within one month after each subsequent incident, each Party shall provide to the Secretariat the following information regarding every natural and legitimate event, activity and condition undertaken by it or occurring within its territory that might create ambiguity or uncertainty regarding Treaty compliance:

(a) The date and time of the incident;

(b) The geographic co-ordinates and height or depth of the incident;

(c) The nature of the surrounding medium and seismic transmission materials;

(d) The nature and size or extent of the incident.

3. Within one year after the entry into force of the Protocol, and within one month after the discovery or creation of any subsequent items, each Party shall supply the Secretariat with the following information regarding any large underground cavities created or discovered by it or occurring within its territory:

(a) The geographic co-ordinates and depth of the cavity;

(b) The size and rough shape of the cavity;

(c) The date of creation or discovery of the cavity;

(d) The nature of the surrounding medium and seismic transmission materials;

(e) The purpose or function of the cavity;

(f) The nature of any contents of the cavity.

4. Each party that has conducted more than one nuclear explosion shall provide to the Secretariat the following information regarding all chemical explosions greater than 3 tons of TNT equivalent occurring anywhere under its jurisdiction and control; and each other Party shall provide the following information regarding all chemical explosions greater than 300 tons of TNT equivalent occurring anywhere under its jurisdiction and control:

(a) The geographic co-ordinates and depth of the explosion;

(b) The nature of the surrounding medium and seismic transmission materials;

- (c) The nature and quantity of the explosive used;
- (d) The purpose of the explosion;
- (e) The explosive power of the event;
- (f) The date and time of the explosion;
- (g) The mode of explosion (ripple fire or otherwise).

5. The Party shall provide the information specified in paragraph 4 to the Secretariat one month before the scheduled explosion. If the planned parameters are altered, the Party shall notify the Secretariat one week before the event. If the planned parameters are altered again, the Party shall notify the Secretariat 24 hours before the event. If the actual event departs from the planned and reported parameters, the Party shall notify the Secretariat within 24 hours after the event. If there is an accidental, unauthorized or natural explosion of comparable force, the Party shall notify the Secretariat immediately and shall provide the same types of information as soon as possible and no later than one month after the event.

6. Within 12 hours after any Party launches a space vehicle, it shall provide to the Secretariat all the registry information specified in the 1975 Convention on Registration of Objects Launched into Outer Space.

7. Each Party shall notify the Secretariat immediately whenever a vertical shaft greater than 1 metre in diameter and greater than 200 metres in depth is drilled at any location within its jurisdiction and control.

8. Each Party shall notify the Secretariat immediately whenever a horizontal tunnel greater than 1 metre in diameter and having an overburden of greater than 200 metres is drilled at any location within its jurisdiction and control.

9. The Secretariat shall develop and promulgate standardized forms through which the Parties shall report the information required by this annex. The Secretariat shall advise Parties regarding conformity with reporting forms and procedures, provide training and assistance in completing the forms, and modify the forms as appropriate.

10. The Secretariat shall have the power to undertake corroboration visits, to confirm the accuracy of the information reported under this annex and to observe activities and circumstances reported.

Appendix 1: Stations of permanent global monitoring network

Preliminary list of seismic monitoring stations

From a seismic monitoring perspective, there are two basic types of geophysical terrain: (a) cratons and shields, stable platforms, and deep ocean islands; and (b) rift zones, orogenic belts (active mountain building areas), salt domes, and unconsolidated sedimentary deposits.

Non-nuclear-weapon States

Protocol II calls for the seismic monitoring of non-nuclear States at the level of 0.5kt tamped. A yield of 0.5kt corresponds to a seismic wave magnitude of 3.5mb, assuming the shot to be full tamped in hard rock. Thus, the network must be capable of detecting a magnitude 3.5mb event anywhere.

In the non-nuclear States "quality-2" stations would be used for monitoring. Quality-2 stations are current off-the-shelf high-technology stations. They consist of a nine element broad-band and three component low-noise seismometers. The individual elements are typical of a modern station, including feedback broad-band seismometers and direct digital recording. As part of a global network, quality-2 stations can monitor 3.20 million sq. km. of type-A terrain and 1.57 million sq. km. of type-B terrain down to the magnitude of 3.5mb.

1.1. One hundred and two of the Parties are smaller than 1.57 million sq. km and may therefore be monitored by a single seismic monitoring station. Indeed, in places where several small States border each other it may not be necessary that each State host a station. Mutually agreed regional arrangements that reduced the total number of stations without diminishing overall monitoring capability could be submitted to the Assembly for approval.

1.2. Four African States are larger than 1.57 million sq. km. but smaller than 3.2 million sq. km. (Algeria, Libyan Arab Jamahiriya, Sudan and Zaire); since they consist of primarily type-A terrain, they can each be monitored with a single quality-2 station as well.

1.3. The remaining eight non-nuclear States would require more than one station:

Argentina	2 stations
Australia	3 stations
Brazil	4 stations
Canada	4 stations
India	2 stations
Indonesia	2 stations
Iran	2 stations
Mexico	2 stations
	<hr/>
Total	21 stations
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The cost for the stations and instrumentation placed in non-nuclear States would be approximately \$US 50.8 million (\$US 0.4 million per quality-2 station).

Nuclear-weapon States

The Protocol calls for seismic monitoring of nuclear-weapon States at the level of 0.005kt fully tamped explosion in hard rock. This yield was selected to correspond approximately to a 0.2kt nuclear explosion in a large cavity (i.e. decoupled). A network capable of detecting down to 1.7mb is required in this case.

"Quality-1" stations would be installed in the nuclear testing States. Quality-1 stations are state-of-the-art research tools. They utilize a three component broad-band borehole seismometer supplemented by four single-element outstations and a three component surface seismometer at the top of the borehole. Quality-1 stations are capable of monitoring 0.438 million sq. km. of type-A terrain and 0.220 million sq. km. of type-B terrain down to the magnitude of 1.7mb.

2. The nuclear testing States would require:

United Kingdom	1 station */
United States	20 stations
Soviet Union	38 stations
Total	<u>59 stations</u>

*/ The normal requirement for a nation of the size and terrain of the United Kingdom would be one quality-1 station. It may be, however, that good, low-noise sites will be difficult to find in the United Kingdom, necessitating one or two more stations.

The cost for the stations and instrumentation placed in nuclear testing States will be approximately \$US 59 million (\$US 1 million per quality-1 station).

International territory

3. Thirty-three quality-1 stations would be placed in international territory, primarily to monitor ocean areas, at a cost of approximately \$US 33 million.

Summary

1. Seismic stations for non-nuclear States	127 stations
2. Seismic stations for nuclear testing States	59 stations
3. Seismic stations for international territory	33 stations
Total number	<u>219 stations</u>

1. Cost for stations in non-nuclear States	\$US 50.8 million
2. Cost for stations in nuclear testing States	\$US 66.0 million
3. Cost for stations in international territory	\$US 33.0 million
Total cost	<u>\$US 149.8 million</u>

By comparison, a single nuclear-weapon-test explosions cost \$US 30-100 million.

CONFERENCE ON DISARMAMENT

CD/1060
14 February 1991

Original: ENGLISH

Mandate for an Ad hoc Committee under Agenda Item 1

"Nuclear Test Ban"

(Adopted at the 582nd plenary meeting on 14 February 1991)

In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final document, the Conference on Disarmament decides to re-establish an Ad hoc Committee under item 1 of its agenda entitled "Nuclear Test Ban".

The Conference requests the Ad hoc Committee to initiate, as a first step towards achieving a nuclear test ban treaty, substantive work on specific and interrelated test ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad hoc Committee to examine the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test ban treaty. The Ad hoc Committee will also take into account the work of the Ad hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

The Ad hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1991 session.

CONFERENCE ON DISARMAMENT

CD/1065
22 February 1991

Original: ENGLISH

Thirty-first session

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE
THIRTY-FIRST SESSION OF THE AD HOC GROUP OF SCIENTIFIC
EXPERTS TO CONSIDER INTERNATIONAL CO-OPERATIVE MEASURES
TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-first formal session from 11 to 21 February 1991, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-third session of the Group convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group continues to be open to all member States of the Conference on Disarmament, as well as upon request to non-member States. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Belgium, Canada, China, Czech and Slovak Federal Republic, Egypt, Germany, Hungary, Iran (Islamic Republic of), Italy, Japan, Netherlands, Pakistan, Poland, Romania, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. At their request and on the basis of previous invitations by the Conference on Disarmament, scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Denmark, Finland, New Zealand, Norway, Spain and Switzerland.
4. Two representatives of the World Meteorological Organization (WMO) also attended the session.
5. Under the current mandate of the Ad Hoc Group, information on national investigations related to the work of the Group has been presented by experts

from Australia, Austria, Belgium, Bulgaria, Canada, China, Czech and Slovak Federal Republic, Denmark, Egypt, Finland, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Kenya, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Romania, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and United States of America.

6. The Ad Hoc Group reviewed the results of experimental activities in preparation for the main part of its Second Technical Test (GSETT-2). The Group noted that the data communication experiment carried out in October/November 1990 turned out to be useful in helping sort out practical communications problems. The Group noted further that 24 countries participated in a trial test during 26 November-2 December, which was undertaken as part of a gradual build-up to the envisaged full-scale testing of the system. For the test period, National Data Centers (NDCs) were operated in each of the 24 participating countries; 4 experimental International Data Centers (EIDCs) were operated; and modern international communications links were utilized. Compared to previous tests considerable improvements were achieved in the functioning of all parts of the system.

7. In reviewing the results of the trial test, the Ad Hoc Group noted that the instructions contained in its Conference Room Paper 190 had worked very well, and that only a few details needed to be modified in preparation for the full-scale experiment. The Group agreed on the necessary modifications, and also collected final updates to its Sourcebook (Conference Room Paper 167). The Ad Hoc Group now considers that the basic preparations have been made at most of the NDCs and all of the EIDCs to conduct the full-scale experiment. However, it is essential to improve the direct inter-computer satellite links between the EIDCs in Moscow and Washington, D.C. Also, for a few of the NDCs, some additional preparations will need to be made.

8. The Ad Hoc Group has stressed to the Conference on Disarmament the importance of broadening the level of participation in GSETT-2 in order to meet the objectives of the large-scale test (e.g. in CD/1032). Thus far, 28 countries have indicated their intentions to establish National Data Centers and to participate in the upcoming main phase of GSETT-2. This participation is essential for the full-scale experiment. Several additional countries have expressed an intent to participate in GSETT-2 if the necessary arrangements can be completed prior to the planned date for starting the main phase. Such participation will improve the results of the experiment and is strongly encouraged. The Group expressed its appreciation for the efforts of Finland and Austria in supporting the participation of Zambia and Peru. The Group regretted the limited participation in the experiment, particularly by countries in South America and Africa. However, the Group considers that the beginning of the main phase of GSETT-2 should not be delayed.

9. The Ad Hoc Group decided that the full-scale experiment would be conducted from 22 April to 9 June 1991. This will comprise 42 consecutive data days, from 22 April to 2 June and 7 additional days for the completion of the Final Event Bulletins by the EIDCs.

10. The Ad Hoc Group discussed with the WMO representatives the preparations that would need to be made for those countries which would be using the WMO/Global Telecommunications System (GTS) during the full-scale experiment. The Group took note of some technical problems that needed to be resolved.

11. The Ad Hoc Group conducted discussions on evaluation criteria for GSETT-2, based upon material presented by a specially appointed study group. The Ad Hoc Group considers the evaluation aspect to be very important, and that pertinent information has to be collected systematically during the test. Accordingly, the Ad Hoc Group agreed that all participants should compile information according to agreed guidelines, and submit this information to the evaluation group, no later than 22 June 1991.

12. The Ad Hoc Group also discussed plans for evaluating and reporting the results of GSETT-2. The Group envisages submitting a preliminary report on the results of GSETT-2 to the Conference on Disarmament during its next session.

The Group further envisages submitting a report on a comprehensive evaluation of the results of the test. The Group will make all effort to complete this report during the spring session of 1992, and if this cannot be achieved, no later than the end of 1992. In this regard, the Group believes it will be important for facilities to remain available to the extent required during 1992 in order to take part in tests that may be required for a successful evaluation of GSETT-2. The Group will again consider this issue at its next session.

13. The Ad Hoc Group conducted a preliminary discussion on the work of the Group remaining under its current mandate and future plans. The Group expressed the view that much valuable work could be conducted in this context. The Group expects to be able to develop specific suggestions in this regard also taking into account the progress in the evaluation of GSETT-2.

14. The Ad Hoc Group suggests that, on the understanding that there are no financial implications to the Conference on Disarmament, the International Maritime Satellite Organization (INMARSAT) be invited to attend the next session of the Group to discuss possibilities for the use of INMARSAT in the development of the communications aspect of a future global seismic data exchange system.

15. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 29 July to 9 August 1991.

CONFERENCE ON DISARMAMENT

CD/1066
8 March 1991

Original: ENGLISH

LETTER DATED 28 FEBRUARY 1991 FROM THE REPRESENTATIVE OF THE UNITED STATES OF AMERICA ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF THE 1974 TREATY BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON THE LIMITATION OF UNDERGROUND NUCLEAR WEAPON TESTS, TOGETHER WITH ITS PROTOCOL */

I have the honour to forward to you the 1974 Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapons Tests, together with its Protocol, which entered into force following the exchange of instruments of ratification on 11 December 1990.

In accordance with past practice, Minister Batsanov, USSR Representative to the Conference on Disarmament, will transmit these documents in Russian to the Conference on Disarmament.

I ask that you take the appropriate steps to issue this treaty text as an official document of the Conference on Disarmament and have it distributed to all member delegations and non-member States participating in the work of the Conference.

(Signed) Stephen J. Ledogar
Representative of the
United States of America to
the Conference on Disarmament

*/ The official Russian text of the above-mentioned Treaty together with its Protocol is to be found in CD/1068.

Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests

Signed at Moscow July 3, 1974

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to take effective measures toward reductions in strategic arms, nuclear disarmament, and general and complete disarmament under strict and effective international control,

Recalling the determination expressed by the Parties to the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time, and to continue negotiations to this end,

Noting that the adoption of measures for the further limitation of underground nuclear weapon tests would contribute to the achievement of these objectives and would meet the interests of strengthening peace and the further relaxation of international tension,

Reaffirming their adherence to the objectives and principles of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water and of the Treaty on the Non-Proliferation of Nuclear Weapons,

Have agreed as follows:

Article I

1. Each Party undertakes to prohibit, to prevent, and not to carry out any underground nuclear weapon test having a yield exceeding 150 kilotons at any place under its jurisdiction or control, beginning March 31, 1976.

2. Each Party shall limit the number of its underground nuclear weapon tests to a minimum.

3. The Parties shall continue their negotiations with a view toward achieving a solution to the problem of the cessation of all underground nuclear weapon tests.

Article II

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with the generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

3. To promote the objectives and implementation of the provisions of this Treaty the Parties shall, as necessary, consult with each other, make inquiries and furnish information in response to such inquiries.

Article III

The provisions of this Treaty do not extend to underground nuclear explosions carried out by the Parties for peaceful purposes. Underground nuclear explosions for peaceful purposes shall be governed by an agreement which is to be negotiated and concluded by the Parties at the earliest possible time.

Article IV

This Treaty shall be subject to ratification in accordance with the constitutional procedures of each Party. This Treaty shall enter into force on the day of the exchange of instruments of ratification.

Article V

1. This Treaty shall remain in force for a period of five years. Unless replaced earlier by an agreement in implementation of the objectives specified in paragraph 3 of Article I of this Treaty, it shall be extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to the expiration of the Treaty. Before the expiration of this period the Parties may, as necessary, hold consultations to consider the situation relevant to the substance of this Treaty and to introduce possible amendments to the text of the Treaty.

2. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from this Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

3. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

DONE at Moscow on July 3, 1974, in duplicate, in the English and Russian languages, both texts being equally authentic.

For the United States of America:

RICHARD NIXON,

The President of the United States of America

For the Union of Soviet Socialist Republics:

L. BREZHNEV,

General Secretary of the Central Committee of the CPSU.

PROTOCOL TO THE TREATY BETWEEN
THE UNITED STATES OF AMERICA AND
THE UNION OF SOVIET SOCIALIST REPUBLICS
ON THE LIMITATION OF UNDERGROUND NUCLEAR WEAPON TESTS

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Confirming the provisions of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests of July 3, 1974, hereinafter referred to as the Treaty,

Convinced of the necessity to ensure effective verification of compliance with the Treaty,

Have agreed as follows:

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SECTION I. DEFINITIONS

For the purposes of this Protocol:

1. The term "test site" means a geographical area for the conduct of underground nuclear weapon tests, specified in paragraph 1 or in accordance with paragraph 2 of Section II of this Protocol.

2. The term "underground nuclear weapon test," hereinafter "test," means either a single underground nuclear explosion conducted at a test site, or two or more underground nuclear explosions conducted at a test site within an area delineated by a circle having a diameter of two kilometers and conducted within a total period of time of 0.1 second. The yield of a test shall be the aggregate yield of all explosions in the test.

3. The term "explosion" means the release of nuclear energy from an explosive canister.

4. The term "explosive canister" means, with respect to every explosion, the container or covering for one or more nuclear explosives.

5. The term "Testing Party" means the Party conducting a test.

6. The term "Verifying Party" means the Party entitled to carry out, in accordance with this Protocol, activities related to verification of compliance with the Treaty by the Testing Party.

7. The term "Designated Personnel" means personnel appointed by the Verifying Party from among its nationals and included on its list of Designated Personnel, in accordance with Section IX of this Protocol, to carry out activities related to verification in accordance with this Protocol in the territory of the Testing Party.

8. The term "Transport Personnel" means personnel appointed by the Verifying Party from among its nationals and included on its list of Transport Personnel, in accordance with Section IX of this Protocol, to provide transportation for Designated Personnel, their baggage, and equipment of the Verifying Party between the territory of the Verifying Party and the point of entry in the territory of the Testing Party.

9. The term "point of entry" means Washington, D.C. (Dulles International Airport), for Designated Personnel and

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Transport Personnel, and Travis Air Force Base, California, for Designated Personnel and Transport Personnel and for equipment specified in Section VIII of this Protocol, with respect to the United States of America; and Moscow (Sheremetyevo-2 International Airport) for Designated Personnel and Transport Personnel and for equipment specified in Section VIII of this Protocol, and Leningrad (Pulkovo-2 International Airport) for Designated Personnel and Transport Personnel, with respect to the Union of Soviet Socialist Republics. Other locations may serve as points of entry for specific tests, as agreed by the Parties.

10. The term "hydrodynamic yield measurement method" means the method whereby the yield of a test is derived from on-site, direct measurement of the properties of the shock wave as a function of time during the hydrodynamic phase of the ground motion produced by the test.

11. The term "seismic yield measurement method" means the method whereby the yield of a test is derived from measurement of parameters of elastic ground motion produced by the test.

12. The term "on-site inspection" means activities carried out by the Verifying Party at the test site of the Testing Party, in accordance with Section VII of this Protocol, for the purposes of independently obtaining data on conditions under which the test will be conducted and for confirming the validity of data provided by the Testing Party.

13. The term "emplacement hole" means any drill-hole, shaft, adit or tunnel in which one or more explosive canisters, associated cables, and other equipment are installed for the purposes of conducting a test.

14. The term "end of the emplacement hole" means the reference point established by the Testing Party beyond the planned location of each explosive canister along the axis of the emplacement hole.

15. The term "satellite hole" means any drill-hole, shaft, adit or tunnel in which sensing elements and cables and transducers are installed by the Verifying Party for the purposes of hydrodynamic measurement of the yield of a specific test.

16. The term "standard configuration" means either the standard vertical configuration or the standard horizontal configuration of a test described in paragraph 2 or 3 of Section V of this Protocol.

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17. The term "non-standard configuration" means a configuration of a test different from that described in paragraph 2 or 3 of Section V of this Protocol.

18. The term "hydrodynamic measurement zone" means a region, the dimensions of which are specified in paragraph 1 of Section V of this Protocol, within which hydrodynamic yield measurements are carried out.

19. The term "reference test" means a test, identified by the Testing Party as a reference test, that meets the requirements of paragraph 8 of Section V of this Protocol.

20. The term "emplacement point" means the point in the emplacement hole that coincides with the center point of an emplaced explosive canister.

21. The term "choke section" means a barrier designed to restrict the flow of energy from an explosive canister.

22. The term "area of a pipe" or "area of a cableway" means the area of the external cross section of that pipe or cableway measured in a plane perpendicular to the axis of that pipe or cableway at the point within the zone specified in paragraph 2(c), 3(e), or 3(f) of Section V of this Protocol where its cross section is largest.

23. The term "sensing elements and cables" means switches, cables, and cable segments that provide direct measurement of the position of a shock front as a function of time, and are installed in a satellite hole by the Verifying Party for the purposes of use of the hydrodynamic yield measurement method.

24. The term "transducer" means a device that converts physical properties of a shock wave, such as stress and particle velocity, into a recordable signal, and is installed in a satellite hole by the Verifying Party, with associated power supplies, for the purposes of use of the hydrodynamic yield measurement method, with respect to explosions having a planned yield exceeding 50 kilotons and characteristics differing from those set forth in paragraph 2 or 3 of Section V of this Protocol.

25. The term "core sample" means an intact cylindrical sample of geologic material having dimensions no less than two centimeters in diameter and two centimeters in length.

26. The term "rock fragment" means a sample of geologic material having an irregular shape and a volume no less than 10 cubic centimeters.

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27. The term "geodetic measurements" means the determination of the geometric position of points within tunnels or cavities.

28. The term "Designated Seismic Station" means any one of the seismic stations designated by each Party, in accordance with Section VI of this Protocol, at which activities related to verification are carried out in accordance with this Protocol.

29. The term "Bilateral Consultative Commission" means the Commission established in accordance with Section XI of this Protocol.

30. The term "Coordinating Group" means a working group of the Bilateral Consultative Commission that is established for each test with respect to which activities related to verification are carried out.

31. The term "coordinated schedule" means the schedule, including the specific times and durations for carrying out activities related to verification for a specific test, established in the Coordinating Group as specified in paragraph 12 of Section XI of this Protocol.

32. The term "Nuclear Risk Reduction Centers" means the Centers located in Washington, D.C., and Moscow, established in accordance with the Agreement Between the United States of America and the Union of Soviet Socialist Republics on the Establishment of Nuclear Risk Reduction Centers of September 15, 1987.

SECTION II. TEST SITES

1. The test sites for the Parties are: the Nevada Test Site, for the United States of America; and the Northern Test Site (Novaya Zemlya) and the Semipalatinsk Test Site, for the Union of Soviet Socialist Republics. Upon entry into force of the Treaty, each Party, for each of its test sites, shall provide the other Party with:

(a) a precise written description of the boundaries; and

(b) a diagram with geographic coordinates of the boundaries to the nearest second, to a scale no smaller than 1:250,000.

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2. Following entry into force of the Treaty, if a Party decides to establish a new test site or to change the boundaries of a test site specified in paragraph 1 of this Section, the description and diagram specified in paragraph 1 of this Section shall be transmitted to the other Party no less than 12 months prior to the planned date for conducting the first test at the new test site or area of expansion of a previously specified test site.

3. A test site of a Party shall be located only within its territory. All tests shall be conducted solely within test sites specified in paragraph 1 or in accordance with paragraph 2 of this Section.

4. For the purposes of the Treaty and this Protocol, all underground nuclear explosions at test sites specified in paragraph 1 or in accordance with paragraph 2 of this Section shall be considered underground nuclear weapon tests and shall be subject to all provisions of the Treaty and this Protocol.

SECTION III. VERIFICATION MEASURES

1. For purposes of verification of compliance with the Treaty, in addition to using available national technical means, the Verifying Party shall have the right, with respect to tests that are conducted 200 days or more following entry into force of the Treaty:

(a) with respect to a test having a planned yield exceeding 50 kilotons, to carry out any or all of the verification activities associated with use of the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, with respect to each explosion in the test;

(b) with respect to a test having a planned yield exceeding 50 kilotons, to carry out any or all of the verification activities associated with use of the seismic yield measurement method, in accordance with Section VI of this Protocol; and

(c) with respect to a test having a planned yield exceeding 35 kilotons, to carry out any or all of the verification activities associated with on-site inspection, in accordance with Section VII of this Protocol, with respect to each explosion in the test, except that such activities may be carried out with respect to a test having a planned yield exceeding 50

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kilotons only if the Verifying Party does not use the hydrodynamic yield measurement method.

2. In addition to the rights specified in paragraph 1 of this Section, for the purposes of building confidence in the implementation of this Protocol and improving its national technical means of verification, the Verifying Party shall have the right:

(a) if, in each of the five calendar years immediately following entry into force of the Treaty, the Testing Party does not conduct at least two tests having a planned yield exceeding 50 kilotons, to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, with respect to two tests from among those having the highest planned yields that the Testing Party conducts in that calendar year;

(b) if, in the sixth calendar year following entry into force of the Treaty and in each calendar year thereafter, unless the Parties otherwise agree, the Testing Party does not conduct at least one test having a planned yield exceeding 50 kilotons, to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, with respect to one test from among those having the highest planned yield that the Testing Party conducts in that calendar year;

(c) if, in any calendar year, the Testing Party postpones a test having a planned yield of 50 kilotons or less to the following calendar year, after having been notified by the Verifying Party of its intent to use the hydrodynamic yield measurement method with respect to that test, to use such method with respect to that test in the following calendar year. This right shall be additional to the rights specified in paragraph 1(a) of this Section and in subparagraphs (a) and (b) of this paragraph; and

(d) in addition to the rights specified in subparagraphs (a), (b), and (c) of this paragraph, if, in each of the five calendar years beginning with the conduct of the first test by the Testing Party at a new test site, the Testing Party does not conduct at least two tests having a planned yield exceeding 50 kilotons at the new test site, the Verifying Party shall have the right to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, with respect to two tests from among those having the highest planned yields that the Testing Party conducts at the new test site in that calendar year.

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3. If the Verifying Party has notified the Testing Party that it intends to use the hydrodynamic yield measurement method with respect to a specific test including more than one explosion, unless the Parties agree on verification measures with respect to such a test:

(a) the distance between the closest points of any two adjacent explosive canisters shall be no less than 50 meters; and

(b) the time of each explosion shall be established by the Testing Party so as to permit the carrying out of hydrodynamic yield measurements for each explosion for a distance of no less than 30 meters in the satellite hole closest to the emplacement hole with which it is associated.

4. If the Verifying Party has notified the Testing Party that it intends to use the hydrodynamic yield measurement method with respect to a specific test, and if that test is conducted in more than one emplacement hole, the Testing Party shall have the right to conduct that test only if no more than one emplacement hole has characteristics or contains explosive canisters having characteristics differing from those set forth in paragraph 2 or 3 of Section V of this Protocol with respect to a test of standard configuration, unless the Parties agree on verification measures with respect to such a test.

5. The Testing Party shall have the right to conduct a test having a planned yield exceeding 35 kilotons within a time period of less than two seconds of any other test having a planned yield exceeding 35 kilotons only if the Parties agree on verification measures with respect to such tests. No test shall be conducted within 15 minutes prior to or following a reference test, unless the Parties otherwise agree.

6. The Testing Party shall have the right to conduct a test having a planned yield exceeding 35 kilotons in a cavity having a volume exceeding 20,000 cubic meters only if the Parties agree on verification measures with respect to such a test.

7. The Verifying Party, by notifying the Testing Party that it intends to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration having a planned yield exceeding 50 kilotons, shall have the right to require a reference test for this non-standard test, in order to compare the yields measured through its national technical means for these two associated tests with the yield obtained by carrying out hydrodynamic yield measurement of the reference test. The right of the

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Verifying Party to a reference test shall be independent of whether or not it actually carries out hydrodynamic yield measurements of the test of non-standard configuration.

8. With respect to the requirement for a reference test:

(a) if the Testing Party, at the time it provides notification of a test, identifies that test as a reference test for a future test of non-standard configuration, and if the Verifying Party does not use the hydrodynamic yield measurement method with respect to the identified reference test, the Verifying Party shall forfeit its right to require a reference test for that test of non-standard configuration and for any subsequent test of non-standard configuration that would be associated with that reference test, if the Testing Party conducts the identified reference test;

(b) the Testing Party shall have the right to identify only one test of standard configuration as a reference test not associated with any specific test of non-standard configuration until it has conducted an associated test of non-standard configuration for which this test serves as a reference test, or unless it simultaneously provides notification of the associated test of non-standard configuration; and

(c) if the Testing Party, at the time it provides notification of a test of standard configuration, indicates that the test will satisfy a requirement for a reference test for a previously conducted test of non-standard configuration, and if the Verifying Party notifies the Testing Party of its intent not to use the hydrodynamic yield measurement method with respect to that reference test, the Verifying Party shall forfeit its right to require a reference test for the previously conducted test of non-standard configuration. In that case, the Testing Party shall have the right to cancel that reference test.

9. Following notification by the Verifying Party, in accordance with paragraph 5 of Section IV of this Protocol, of whether or not it intends to carry out any of the activities related to verification for a specific test, and, if so, which activities, the Verifying Party shall forfeit its right to revise that notification unless the Testing Party changes the previously declared location of that test by more than one minute of latitude or longitude or changes the planned yield of a test from 50 kilotons or less to a planned yield exceeding 50 kilotons. If the Testing Party makes any such change, the Verifying Party shall have the right to revise its previous notification and to carry out

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any of the activities specified in paragraph 1 or 2 of this Section and, if the Verifying Party notifies the Testing Party that it intends to carry out activities related to verification with respect to that test, in accordance with paragraph 20 of Section IV of this Protocol, the Testing Party shall not conduct the test less than 180 days following the date of the revised notification by the Verifying Party, unless the Parties otherwise agree.

10. Designated Personnel shall have the right to carry out activities related to verification in accordance with this Protocol, 24 hours a day, provided such activities are consistent with the safety requirements of the Testing Party at the test site or Designated Seismic Station. All operations and procedures that require the participation of Designated Personnel and personnel of the Testing Party shall be carried out in accordance with the technical operations and practices at the test site or Designated Seismic Station of the Testing Party, and in this connection:

(a) Designated Personnel:

(i) shall not interfere with activities of personnel of the Testing Party at the test site or Designated Seismic Station; and

(ii) shall be responsible for the working of their equipment, its timely installation and operation, participation in such operations, including dry runs, as the Testing Party may request, and recording of data; and

(b) the Testing Party:

(i) shall be under no obligation to delay the test because of any malfunction of the equipment of the Verifying Party or inability of Designated Personnel to carry out their functions, unless the Testing Party caused such a situation to arise; and

(ii) shall bear full responsibility for the preparation and conduct of the test and shall have exclusive control over it.

11. If the Verifying Party has notified the Testing Party that it intends to carry out activities related to verification for a specific test, the Testing Party shall have the right to make changes in the timing of its operations related to the conduct of that test, except that the Testing Party shall not make changes in the timing of its operations related to the conduct of that test that would preclude Designated Personnel from carrying out their rights related to verification provided in this Protocol.

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If the Testing Party notifies the Verifying Party of a change in the timing of its operations that the Verifying Party deems would either preclude or significantly limit the exercise of such rights, the Coordinating Group shall meet at the request of the Representative of the Verifying Party to the Coordinating Group, to consider the change in order to ensure that the rights of the Verifying Party are preserved. If the Coordinating Group cannot agree on a revision to the coordinated schedule that will ensure the rights of both Parties as provided in this Protocol, there shall be no advancement of events within the coordinated schedule due to such a change. Either Party may request that the Bilateral Consultative Commission consider any such change in timing of operations or in the coordinated schedule, in accordance with paragraph 15 of Section XI of this Protocol.

SECTION IV. NOTIFICATIONS AND INFORMATION RELATING TO TESTS

1. Unless otherwise provided in this Protocol, all notifications required by this Protocol shall be transmitted through the Nuclear Risk Reduction Centers. The Nuclear Risk Reduction Centers may also be used, as appropriate, to transmit other information provided in accordance with this Protocol.

2. Not later than the June 1 immediately following entry into force of the Treaty, and not later than June 1 of each year thereafter, each Party shall provide the other Party with the following information on tests that it intends to conduct in the following calendar year:

(a) the projected number of tests having a planned yield exceeding 35 kilotons;

(b) the projected number of tests having a planned yield exceeding 50 kilotons; and

(c) if the number of tests declared in accordance with subparagraphs (a) and (b) of this paragraph is less than the number of tests for which rights are specified in paragraph 2 of Section III of this Protocol, whether it intends to conduct a sufficient number of other tests to permit the Verifying Party to exercise fully the rights specified in paragraph 2 of Section III of this Protocol.

3. On the date of entry into force of the Treaty each Party shall provide the other Party with the information

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specified in paragraphs 2(a) and 2(b) of this Section for the remainder of the calendar year in which the Treaty enters into force, and, if the Treaty enters into force after June 1, information specified in paragraph 2 of this Section for the following calendar year.

4. No less than 200 days prior to the planned date of any test with respect to which the Verifying Party has the right to carry out any activity related to verification in accordance with this Protocol, the Testing Party shall provide the Verifying Party with the following information to the extent and degree of accuracy available at that time:

(a) the planned date of the test and its designation;

(b) the planned date of the beginning of emplacement of explosive canisters;

(c) the location of the test, expressed in geographic coordinates to the nearest minute;

(d) whether the planned yield of the test exceeds 35 kilotons;

(e) whether the planned yield of the test exceeds 50 kilotons;

(f) if the planned yield is 50 kilotons or less, whether the test is one of the tests with respect to which the Verifying Party has the right to use the hydrodynamic yield measurement method, in accordance with paragraph 2 of Section III of this Protocol;

(g) the planned depth of each emplacement hole to the nearest 10 meters;

(h) the type or types of rock in which the test will be conducted, including the depth of the water table;

(i) whether the test will be of standard or non-standard configuration; and

(j) whether the test will serve as a reference test for:

(i) a previously conducted test of non-standard configuration with which such a reference test is associated;

(ii) a future test of non-standard configuration for which notification has been

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provided or is being simultaneously provided in accordance with paragraph 8(b) of Section III of this Protocol; or

(iii) a future test of non-standard configuration for which the Testing Party has not yet provided notification.

5. Within 20 days following receipt of information specified in paragraph 4 of this Section, the Verifying Party shall inform the Testing Party, in a single notification, whether or not it intends to carry out, with respect to this test, any activities related to verification that it has a right to carry out, in accordance with Section III of this Protocol, and, if so, whether it intends:

(a) to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol;

(b) to use the seismic yield measurement method, in accordance with Section VI of this Protocol; and

(c) to carry out on-site inspection, in accordance with Section VII of this Protocol.

6. Within 30 days following notification by the Verifying Party, in accordance with paragraph 11 of Section XI of this Protocol, that it requires a reference test for a test of non-standard configuration, the Testing Party shall notify the Verifying Party whether it will meet the requirement for a reference test through:

(a) the identification of a previously conducted reference test;

(b) the identification of a previously conducted test of standard configuration, meeting the requirements for a reference test, with respect to which the Verifying Party carried out hydrodynamic yield measurements;

(c) the identification of a previously notified test of standard configuration, meeting the requirements for a reference test, with respect to which the Verifying Party has notified the Testing Party of its intent to carry out hydrodynamic yield measurements; or

(d) the conduct of a reference test within 12 months of the non-standard test, whose identification as a reference test will be made in the notification, in accordance with paragraph 4(j) of this Section.

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7. If the Verifying Party notifies the Testing Party that it intends to use the hydrodynamic yield measurement method, the Testing Party shall provide the Verifying Party, no less than 120 days prior to the planned date of the test, with the following information:

(a) a description of the geological and geophysical characteristics of the test location, which shall include: the depth of the water table; the stratigraphic column, including the lithologic description of each formation; the estimated physical parameters of the rock, including bulk density, grain density, compressional velocity, porosity, and total water content; and information on any known geophysical discontinuities in the media within each hydrodynamic measurement zone;

(b) the planned cross-sectional dimensions of each emplacement hole in each hydrodynamic measurement zone;

(c) the location and configuration of any known voids larger than one cubic meter within each hydrodynamic measurement zone;

(d) a description of materials, including their densities, to be used to stem each emplacement hole within each hydrodynamic measurement zone;

(e) whether it is planned that each emplacement hole will be fully or partially cased, and, if so, a description of materials of this casing;

(f) whether it is planned that each satellite hole will be fully or partially cased, and, if so, a description of materials of this casing;

(g) a topographic map to a scale no smaller than 1:25,000 and a contour interval of 10 meters or less showing:

(i) an area with a radius of no less than two kilometers centered on the entrance to each emplacement hole, that shall include the area delineated by a circle having a radius of 300 meters centered directly above the planned emplacement point of each explosive canister; and

(ii) a one-kilometer wide corridor centered on the planned location of the above-ground cables of the Verifying Party;

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(h) overall drawings showing the external dimensions of each explosive canister and each choke section, and any pipes or cableways passing through a choke section, as well as any other pipes and cableways connected to that explosive canister and located within five meters of that explosive canister;

(i) the specific locations, referenced to the entrance to each vertical satellite hole or to the surface location of the entrance to each horizontal emplacement hole, at which individual gas-blocking devices shall be installed if such devices are used on the electrical cables specified in paragraphs 3(a) and 3(b) of Section VIII of this Protocol; and

(j) whether the Testing Party will provide satellite communications as specified in paragraph 13 of Section X of this Protocol for use by Designated Personnel.

8. If the Verifying Party notifies the Testing Party that it intends to use the seismic yield measurement method, the Testing Party shall provide the Verifying Party, no less than 120 days prior to the planned date of the test, with the information specified in paragraphs 9(a), 9(b), and 9(c) of this Section.

9. If the Verifying Party notifies the Testing Party that it intends to carry out on-site inspection, the Testing Party shall provide the Verifying Party, no less than 120 days prior to the planned date of the test, with the following information:

(a) a description of the geological and geophysical characteristics of the test location, which shall include: the depth of the water table; the stratigraphic column, including the lithologic description of each formation; the estimated physical parameters of the rock, including bulk density, grain density, compressional velocity, porosity, and total water content; and information on any known geophysical discontinuities in the media within a radius of 300 meters of the planned emplacement point of each explosive canister;

(b) the planned cross-sectional dimensions of each emplacement hole in the portion within 300 meters of the planned emplacement point of each explosive canister;

(c) the location and configuration of any known voids larger than 1000 cubic meters within a radius of

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300 meters of the planned emplacement point of each explosive canister;

(d) whether it is planned that each emplacement hole will be fully or partially cased, and, if so, a description of materials of this casing;

(e) a topographic map to a scale no smaller than 1:25,000 and a contour interval of 10 meters or less showing an area with a radius of no less than two kilometers centered on the entrance to each emplacement hole, that shall include the area delineated by a circle having a radius of 300 meters centered directly above the planned emplacement point of each explosive canister; and

(f) whether the Testing Party will provide satellite communications as specified in paragraph 13 of Section X of this Protocol for use by Designated Personnel.

10. The Testing Party shall immediately notify the Verifying Party of any change in any information provided in accordance with paragraph 2, 3, 4(a), 4(c), 4(d), 4(e), 4(f) or 4(j) of this Section, and:

(a) if the Verifying Party has notified the Testing Party that it intends to carry out activities related to verification in accordance with Section V of this Protocol, of any change in any information provided in accordance with paragraph 4(b), 4(g), 4(h), 4(i), 6 or 7 of this Section, or paragraph 10 of Section XI of this Protocol;

(b) if the Verifying Party has notified the Testing Party that it intends to carry out activities related to verification in accordance with Section VI of this Protocol, of any change in any information provided in accordance with paragraph 4(g), 4(h) or 8 of this Section; and

(c) if the Verifying Party has notified the Testing Party that it intends to carry out activities related to verification in accordance with Section VII of this Protocol, of any change in any information provided in accordance with paragraph 4(b), 4(g), 4(h) or 9 of this Section, or paragraph 10(a) of Section XI of this Protocol.

11. If the Testing Party makes changes in the information specified in paragraph 4(a), 10(a), 10(b) or 10(c) of this Section related to a specific test for which Designated Personnel are present in the territory of the

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Testing Party, it shall also immediately notify, in writing, the Designated Personnel Team Leader carrying out activities related to verification of that test at the test site and at each Designated Seismic Station of such changes.

12. The Testing Party shall immediately inform the Verifying Party of any change in the timing of its operations related to the conduct of a specific test that affects the coordinated schedule, and if Designated Personnel are present in the territory of the Testing Party, it shall also immediately notify, in writing, the Designated Personnel Team Leader carrying out activities related to verification of that test at the test site and at each Designated Seismic Station.

13. If, in carrying out activities related to verification of a specific test, Designated Personnel are present at the test site or any Designated Seismic Station:

(a) no less than 48 hours prior to the initial planned time of the test, the Testing Party shall notify each Designated Personnel Team Leader, in writing, of the time for beginning the period of readiness for the test and the planned time of the test, to the nearest second. This and all subsequent notifications shall be referenced to Universal Time Coordinated and to local time at the test site or the Designated Seismic Station;

(b) except as otherwise provided in this Section, if the Testing Party changes the planned time of the test, it shall immediately notify each Designated Personnel Team Leader, in writing, of the new planned time of the test;

(c) the Testing Party shall conduct the test only within a period of readiness;

(d) unless the Parties otherwise agree, the period of readiness shall begin:

(i) no less than six days following completion of stemming of the hydrodynamic measurement zone of all satellite holes, if verification activities in accordance with Section V of this Protocol are carried out; and

(ii) no more than five days prior to the planned date of the test, if verification activities in accordance with Section VI of this Protocol are carried out;

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(e) the Testing Party may terminate the period of readiness at any time. The Testing Party shall then immediately notify each Designated Personnel Team Leader, in writing, that the period of readiness has been terminated; and

(f) if the Testing Party terminates the period of readiness or changes the time for beginning the period of readiness, it shall provide notice of the time for beginning a new period of readiness to each Designated Personnel Team Leader, in writing, no less than 12 hours prior to beginning this new period of readiness.

14. Following notification in accordance with paragraph 13(a) or 13(b) of this Section, the Testing Party, without further notification, may advance the time of the test by no more than five minutes.

15. After the event readiness signal specified in paragraph 10(b) of Section V of this Protocol has been started:

(a) if the Testing Party delays the test and terminates the event readiness signal at least one second prior to the planned time of the test, it may carry out the test, without further notification, at any time within no more than 60 minutes after the planned time of the test, provided it generates a new event readiness signal; and

(b) if the Testing Party subsequently delays the test without ending the event readiness signal at least one second prior to the planned time of the test, the Testing Party shall end the event readiness signal and shall not begin a new event readiness signal within 20 minutes following that planned time of the test. The Testing Party shall notify each Designated Personnel Team Leader, in writing, of the new planned time of the test, at least 10 minutes prior to the beginning of the new event readiness signal for that test.

16. Following notification in accordance with paragraph 13(a) or 13(b) of this Section, if the test is delayed by more than 60 minutes the Testing Party shall notify each Designated Personnel Team Leader, in writing, of the new planned time of the test no less than 30 minutes prior to the new planned time of the test.

17. During the period of readiness, if a test is delayed by more than three hours from the last notification of the planned time of the test, the Testing Party shall notify each Designated Personnel Team Leader, in writing, of the period during which the test will not be conducted.

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18. No less than one hour following the test, the Testing Party shall notify each Designated Personnel Team Leader, in writing, of the actual time of the test to the nearest 0.1 second.

19. For each test for which notification has been provided in accordance with paragraph 4 of this Section, no less than 48 hours prior to the initial planned time of the test, the Testing Party shall notify the Verifying Party of the planned time of the test to the nearest one second. If the Testing Party subsequently delays the planned time of the test by more than 24 hours, it shall immediately notify the Verifying Party of the new planned time of the test to the nearest one second. No less than three days following the test, the Testing Party shall notify the Verifying Party of the actual time of the test, referenced to Universal Time Coordinated, to the nearest 0.1 second.

20. The Testing Party shall immediately notify the Verifying Party of a change in the location of a test by more than one minute of latitude or longitude or of a change in the planned yield of a test from 50 kilotons or less to a planned yield exceeding 50 kilotons. The Verifying Party shall notify the Testing Party, within 20 days following receipt of notification of such a change in the location or planned yield of the test, whether it intends to carry out for this test any activities related to verification in accordance with paragraph 9 of Section III of this Protocol. If the Verifying Party, in this revised notification, notifies the Testing Party that it intends to carry out any of the activities related to verification that it has a right to carry out in accordance with Section III of this Protocol, the Testing Party shall provide the Verifying Party with the information that it is required to provide in accordance with paragraphs 7, 8, and 9 of this Section and paragraph 10 of Section XI of this Protocol.

21. If the Verifying Party has notified the Testing Party that it intends to use the hydrodynamic yield measurement method, the beginning of emplacement of sensing elements and cables shall not occur less than 90 days after notification of any change in the location of the test by more than one minute of latitude or longitude, unless the Parties otherwise agree.

22. If the Verifying Party has notified the Testing Party that it does not intend to carry out hydrodynamic yield measurements for a specific test, the Testing Party shall have the right to change the configuration of that test from standard to non-standard or vice versa, without notifying the Verifying Party of such change.

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23. If the Verifying Party has notified the Testing Party that it intends to carry out hydrodynamic yield measurements for a specific test, the Testing Party shall immediately notify the Verifying Party of a change in the configuration of that test from standard to non-standard, or vice versa, or of any increase in the number of emplacement holes or explosive canisters of the test. The Verifying Party shall, within five days of notification of any such change, notify the Testing Party whether it will revise its initial notification and whether it deems that this change would either preclude or significantly limit the exercise of its rights provided in this Protocol. If so, the Coordinating Group shall immediately meet to consider a revision in the coordinated schedule that will ensure the rights of both Parties provided in this Protocol. If the Parties cannot agree on a revised coordinated schedule within 15 days following notification by the Testing Party of such a change, the date of notification of the change shall be deemed the initial notification of a test in accordance with paragraph 4 of this Section, and the test shall be conducted no less than 180 days following the date of notification of the change.

24. If the Verifying Party has notified the Testing Party that it intends to carry out on-site inspection with respect to a specific test, and if the Testing Party notifies the Verifying Party of an increase in the number of explosive canisters or an increase in the number of emplacement holes, the Verifying Party shall, within five days of notification of any such change, notify the Testing Party whether it deems that this change would significantly limit the exercise of its rights provided in this Protocol. If so, the Coordinating Group shall immediately meet to consider a revision in the coordinated schedule that will ensure the rights of both Parties provided in this Protocol. If the Parties cannot agree on a revised coordinated schedule within 15 days following notification by the Verifying Party that it deems that, as a result of such an increase, its rights would be significantly limited, the date of that notification shall be deemed notification by the Verifying Party that it intends to carry out on-site inspection in accordance with paragraph 5 of this Section, and the test shall be conducted no less than 165 days following the date of such notification.

25. The Verifying Party may at any time, but no later than one year following the test, request from the Testing Party clarification of any point of information provided in accordance with this Section. Such clarification shall be provided in the shortest possible time, but no later than 30 days following receipt of the request.

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SECTION V. HYDRODYNAMIC YIELD MEASUREMENT METHOD

1. The hydrodynamic measurement zone is:

(a) with respect to a test of standard configuration, described in paragraph 2 or 3 of this Section, as well as with respect to any explosion having a planned yield of 50 kilotons or less:

(i) if an emplacement hole is vertical, the cylindrical region 25 meters in diameter whose axis is midway between the axes of the emplacement hole and the satellite hole, extending from a point 30 meters below the end of the emplacement hole to a point 100 meters from the end of the emplacement hole in the direction of the entrance to the emplacement hole; or

(ii) if an emplacement hole is horizontal, the cylindrical region 25 meters in diameter whose axis is midway between the axes of the emplacement hole and the satellite hole, extending from a point 15 meters beyond the end of the emplacement hole to a point 65 meters from the end of the emplacement hole in the direction of the entrance to the emplacement hole; and

(b) with respect to a test of non-standard configuration having a planned yield exceeding 50 kilotons:

(i) if an emplacement hole is vertical, the cylindrical region 200 meters in diameter coaxial with the emplacement hole, extending from a point 30 meters below the end of the emplacement hole to a point 100 meters from the center point of the explosive canister in the direction of the entrance to the emplacement hole; or

(ii) if an emplacement hole is horizontal, the cylindrical region 130 meters in diameter whose axis is coaxial with the emplacement hole, extending from a point 15 meters beyond the end of the emplacement hole to a point 65 meters from the center point of the explosive canister in the direction of the entrance to the emplacement hole.

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2. For the purposes of the use of the hydrodynamic yield measurement method, a test shall be deemed of standard vertical configuration if:

(a) each emplacement hole is vertical and cylindrical, and is drilled or excavated with a diameter no greater than four meters;

(b) the bottom of each emplacement hole is filled with stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock, to form a plug no less than three meters thick, and the top of this plug of stemming material is the end of the emplacement hole for the explosive canister emplaced farthest from the entrance to the emplacement hole;

(c) any pipe or cableway connected to an explosive canister passes through a choke section. This choke section is installed on the top of the explosive canister and has the following characteristics:

(i) the diameter of the choke section is no less than that of the explosive canister;

(ii) the choke section is no less than one meter thick;

(iii) the sum of the areas of all pipes and cableways within the choke section does not exceed 0.5 square meters;

(iv) the area of each pipe or cableway within the choke section does not exceed 0.3 square meters;

(v) the part of the choke section in contact with the explosive canister consists of a steel plate having a thickness no less than 0.005 meters; and

(vi) the choke section, except for pipes and cableways, is filled, prior to emplacement, with stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock, and has a product of density and thickness no less than 250 grams per square centimeter;

(d) the length of each explosive canister does not exceed 12 meters and, after an explosive

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canister is emplaced, the lowest part of the choke section is no more than 12 meters above the end of the emplacement hole;

(e) the diameter of each explosive canister does not exceed three meters;

(f) each emplacement hole has been drilled or excavated with a diameter, within each hydrodynamic measurement zone, no more than one meter greater than the diameter of each explosive canister; or, if an emplacement hole has been cased, the inside diameter of the casing, within each hydrodynamic measurement zone, is no more than one meter greater than the diameter of each explosive canister. Within the 15-meter segment above the end of each emplacement hole for each explosive canister, no washcuts penetrate more than one meter into the wall of the emplacement hole;

(g) all voids in or connected to an emplacement hole, within each hydrodynamic measurement zone, external to:

- (i) any explosive canister;
- (ii) any choke sections;
- (iii) any diagnostic canisters; and
- (iv) associated cables and pipes

are filled with stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock;

(h) within each hydrodynamic measurement zone, all voids greater than 10 cubic meters, external and unconnected to an emplacement hole or a satellite hole, and all voids greater than one cubic meter, within two meters of the wall of a satellite hole or any part of an explosive canister, are filled with stemming material having a bulk density no less than 70 percent of the average density of the surrounding rock; and

(i) within each hydrodynamic measurement zone, the distance between a satellite hole and any other drilled hole or excavation is no less than the distance between that satellite hole and the emplacement hole with which it is associated.

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3. For the purposes of the use of the hydrodynamic yield measurement method, a test shall be deemed of standard horizontal configuration if:

(a) each emplacement hole is horizontal, with an excavated cross section, measured in the plane perpendicular to its axis, no greater than five meters by five meters for the first 65 meters from the end of the emplacement hole for each explosive canister, except that any diagnostic canister associated with it shall occupy, in an emplacement hole, space having a cross section no greater than 3.5 meters by 3.5 meters for the first 50 meters of the emplacement hole from the choke section of each explosive canister in the direction of the entrance to the emplacement hole;

(b) the end of each emplacement hole is either:

(i) unsupported native rock, the surface of which is essentially perpendicular to the axis of the emplacement hole; or

(ii) the surface of a plug no less than three meters thick, formed of stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock;

(c) the length of each explosive canister does not exceed 12 meters and, after it is emplaced, the end of the explosive canister farthest from the entrance to the emplacement hole is no less than one meter and no more than two meters from the end of the emplacement hole;

(d) the cross section of each explosive canister measured in the plane perpendicular to the axis of the emplacement hole does not exceed three meters by three meters;

(e) any pipe or cableway connected to an explosive canister and lying entirely within the emplacement hole passes through a choke section. This choke section is installed at the end of the explosive canister nearest to the entrance of the emplacement hole and has the following characteristics:

(i) the dimensions of the choke section perpendicular to the axis of the emplacement hole are no less than those of the explosive canister;

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(ii) the choke section is no less than one meter thick;

(iii) the sum of the areas of all pipes and cableways within the choke section, plus the sum of the areas of pipes and cableways specified in subparagraph (f) of this paragraph, does not exceed 0.5 square meters;

(iv) the area of each pipe or cableway within the choke section does not exceed 0.3 square meters; and

(v) the choke section, except for pipes and cableways meeting the requirements of subparagraphs (e)(iii) and (e)(iv) of this paragraph, is filled with stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock, and has a product of density and thickness no less than 250 grams per square centimeter;

(f) any pipe or cableway connected to any surface of an explosive canister and not lying entirely within the emplacement hole has the following characteristics:

(i) the area of each pipe or cableway within five meters of the explosive canister does not exceed 0.05 square meters; and

(ii) the sum of the areas of all such pipes and cableways within five meters of the explosive canister does not exceed 0.1 square meters;

(g) any diagnostic canister connected to the pipes or cableways specified in subparagraph (f) of this paragraph lies entirely outside the hydrodynamic measurement zone;

(h) all voids in or connected to an emplacement hole, including any bypass or access tunnels within the hydrodynamic measurement zone, external to:

- (i) any explosive canister;
- (ii) any choke sections;
- (iii) any diagnostic canisters; and
- (iv) associated cables and pipes

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are filled with stemming material having a bulk density no less than 60 percent of the average density of the surrounding rock;

(i) within each hydrodynamic measurement zone, all voids greater than 10 cubic meters, external and unconnected to an emplacement hole or a satellite hole, and all voids greater than one cubic meter, within two meters of the wall of a satellite hole or any part of an explosive canister, are filled with stemming material having a bulk density no less than 70 percent of the average density of the surrounding rock; and

(j) within the portion of each hydrodynamic measurement zone extending from the end of the emplacement hole in the direction of the entrance to the emplacement hole, the distance between a satellite hole and any other tunnel or excavation is no less than the distance between that satellite hole and the emplacement hole with which it is associated.

4. With respect to a test of standard configuration, as well as with respect to any explosion having a planned yield of 50 kilotons or less:

(a) personnel of the Testing Party, using their own equipment, shall drill or excavate a satellite hole associated with each emplacement hole, at a time of their own choosing. The Testing Party shall have the right to complete drilling or excavation of a satellite hole for a specific test prior to the arrival of Designated Personnel at the test site to carry out activities related to use of the hydrodynamic yield measurement method for that test. Each satellite hole shall meet the following requirements:

(i) if an emplacement hole is vertical, the axis of the associated satellite hole shall be located 11 meters, plus or minus three meters, from the axis of the emplacement hole within each hydrodynamic measurement zone. If an emplacement hole is horizontal, the axis of the associated satellite hole shall be located 11 meters, plus or minus two meters, from the axis of the emplacement hole within each hydrodynamic measurement zone, and it may be drilled or excavated either as a single continuous hole or in separate consecutive segments associated with each hydrodynamic

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measurement zone. The axis of any satellite hole shall be no less than six meters from the wall of any drilled or excavated cavity or hole;

(ii) its end shall be no less than 30 meters below the level of the end of the associated vertical emplacement hole farthest from the entrance to the emplacement hole, or no less than 15 meters beyond the point at which the satellite hole is closest to the end of the associated horizontal emplacement hole farthest from the entrance to the emplacement hole;

(iii) if it is prepared by drilling, it shall be drilled no less than 0.3 meters and no more than 0.5 meters in diameter. Within each hydrodynamic measurement zone, no washouts shall penetrate more than one meter into the wall of the hole; and

(iv) if it is prepared by excavation, it shall have an excavated cross section, measured in the plane perpendicular to its axis, no greater than 2.5 meters by 2.5 meters within each hydrodynamic measurement zone;

(b) Designated Personnel shall have the right to observe the activities of the personnel of the Testing Party carried out to meet the specifications set forth in paragraph 2(b) of this Section and, if applicable, set forth in paragraph 3(b)(ii) of this Section. A representative sample of no less than 1000 cubic centimeters in volume of the stemming material used to form the plugs specified in paragraphs 2(b) and 3(b)(ii) of this Section shall be provided to Designated Personnel for retention;

(c) Designated Personnel shall have the right to carry out, under observation of personnel of the Testing Party and with their assistance, if such assistance is requested by Designated Personnel, directional surveys and geodetic measurements of each satellite hole and emplacement hole prior to the planned date of the beginning of emplacement of sensing elements and cables;

(d) equipment specified in paragraph 3 of Section VIII of this Protocol shall be operated by Designated Personnel and shall be installed, in accordance with installation instructions provided in accordance with paragraph 6(c) of Section VIII of

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this Protocol, by Designated Personnel under observation of personnel of the Testing Party and with their assistance, if such assistance is requested by Designated Personnel. The location of each hydrodynamic recording facility and the command and monitoring facility of the Verifying Party and the instrumentation facility of the Testing Party specified in paragraph 10(1) of this Section shall be determined by the Testing Party in consultation with the Verifying Party in the Coordinating Group no less than 90 days prior to the beginning of emplacement of sensing elements and cables. Areas for the installation of these facilities, cable supports, and cableways for protection of cables of the Verifying Party, specified in paragraphs 3(b), 3(f), and 3(g) of Section VIII of this Protocol, shall be prepared by the Testing Party in accordance with requirements agreed upon in the Coordinating Group. Only cables of the Verifying Party shall be installed in these cableways. Designated Personnel shall have access, under observation of personnel of the Testing Party, to the cables specified in paragraphs 3(f) and 3(g) of Section VIII of this Protocol and to the cableways in which they are installed, at all times. Personnel of the Testing Party shall have access to these cableways only under observation of Designated Personnel;

(e) Designated Personnel shall have the right to use their own primary electrical power sources to supply electrical power to hydrodynamic equipment specified in paragraph 3 of Section VIII of this Protocol. At the request of the Verifying Party, the Testing Party shall supply electrical power from the standard electrical network of its test site through converters provided by the Verifying Party or, by agreement of the Parties, by the Testing Party;

(f) for each test, the only equipment installed in a satellite hole shall be that of the Verifying Party specified in paragraphs 3(a) and 3(h) of Section VIII of this Protocol. If an emplacement hole is vertical, the end point of the equipment farthest from the entrance to the satellite hole shall be installed no less than 30 meters below the level of the end of the emplacement hole farthest from the entrance to the emplacement hole. If an emplacement hole is horizontal, the end point of this equipment shall be installed no less than 15 meters beyond the point at which a satellite hole is closest to the end of the emplacement hole

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farthest from the entrance to the emplacement hole. For each satellite hole, Designated Personnel shall have the right to install no more than six sensing elements and cables, without regard to the number of switches. Personnel of each Party shall have the right to measure the location of the installed sensing elements and cables;

(g) Designated Personnel shall have the right to conduct a final directional survey and geodetic measurements of each satellite hole upon completion of installation of sensing elements and cables;

(h) personnel of the Testing Party, under observation of Designated Personnel, shall fill all voids in or connected to each satellite hole within each hydrodynamic measurement zone with a stemming material agreed upon by the Parties, having a bulk density no less than 70 percent of the average density of the surrounding rock. A representative sample of no less than 1000 cubic centimeters in volume of each stemming material used in each hydrodynamic measurement zone shall be provided to Designated Personnel for retention. The methods and materials used for stemming satellite holes and any hydrodynamic measurement equipment emplacement pipe shall:

(i) be consistent with the containment practices of the Testing Party;

(ii) be chosen to minimize voids around sensing elements and cables; and

(iii) be chosen to avoid damage to the sensing elements and cables;

(i) Designated Personnel shall have the right to observe the stemming of the hydrodynamic measurement zones of each emplacement hole in accordance with paragraphs 2(g) and 3(h) of this Section. A representative sample of no less than 1000 cubic centimeters in volume of each stemming material used in each hydrodynamic measurement zone shall be provided to Designated Personnel for retention;

(j) the Testing Party shall have the right to case or line each emplacement hole; and

(k) the Testing Party shall have the right to case or line each satellite hole, provided that:

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(i) sensing elements and cables can be installed as specified in subparagraph (f) of this paragraph;

(ii) casing or lining material in each hydrodynamic measurement zone is agreed upon by the Parties; and

(iii) casing or lining in each hydrodynamic measurement zone is affixed to the surrounding formation with material agreed upon by the Parties.

5. In preparation for the use of the hydrodynamic yield measurement method with respect to a test of standard configuration, as well as with respect to any explosion having a planned yield of 50 kilotons or less:

(a) upon their arrival at the test site, no less than 10 days prior to the planned date of the beginning of emplacement of sensing elements and cables, Designated Personnel shall provide the Testing Party with a description of the recording format and the computer program, to enable the Testing Party to read digital data if digital recordings of hydrodynamic data will be made by Designated Personnel;

(b) the Testing Party shall provide Designated Personnel upon their arrival at the test site with the results of any studies of core samples and rock fragments extracted from each emplacement hole and satellite hole and any exploratory holes and tunnels, and the results of logging and geodetic measurements carried out in each emplacement hole, each satellite hole, and any exploratory holes and tunnels, relevant to the geology and geophysics of each hydrodynamic measurement zone, if the Testing Party carried out such studies and measurements;

(c) using their own equipment and under observation of personnel of the Testing Party, Designated Personnel shall have the right to carry out:

(i) if an emplacement hole is vertical, in the emplacement hole and associated satellite hole, caliper logs, directional surveys, geodetic measurements, and depth or distance measurements to determine the dimensions and the relative locations of the emplacement hole and satellite hole, as well as measurements to

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determine the location and volume of all voids within each hydrodynamic measurement zone, using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding;

(ii) if an emplacement hole is vertical, within the hydrodynamic measurement zones of either the emplacement hole or, at the option of the Testing Party, of the satellite hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, acoustic, and television logging;

(iii) if an emplacement hole is horizontal, in the emplacement hole and associated satellite hole, as well as in the drilled holes specified in subparagraph (e)(ii) of this paragraph, caliper logs, directional surveys, geodetic measurements, and distance measurements to determine the dimensions and relative location of these holes, as well as measurements to determine the location and volume of all voids within each hydrodynamic measurement zone using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding; and

(iv) if an emplacement hole is horizontal, in the drilled holes specified in subparagraph (e)(ii) of this paragraph, and within the hydrodynamic measurement zones of the emplacement hole, or, at the option of the Testing Party, of the satellite hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, and acoustic logging;

(d) all logging data and geometrical measurements obtained by Designated Personnel, in accordance with subparagraph (c) of this paragraph, including calibration data, shall be duplicated, and a copy of the data shall be provided to personnel of the Testing Party prior to departure from the test site of Designated Personnel who have carried out these measurements. Calibration data shall include information necessary to confirm the sensitivity of logging equipment under the conditions in which it is used;

(e) Designated Personnel shall have the right to receive:

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(i) if an emplacement hole is vertical, core samples or, at the option of Designated Personnel, rock fragments from the emplacement hole or, at the option of the Testing Party, from the satellite hole, extracted at no more than 10 depths within each hydrodynamic measurement zone, specified by Designated Personnel. The total volume of core samples or rock fragments extracted at each depth shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree; and

(ii) if an emplacement hole is horizontal, core samples or, at the option of Designated Personnel, rock fragments from the emplacement hole or, at the option of the Testing Party, the satellite hole within each hydrodynamic measurement zone. If core samples are extracted from the emplacement hole or, at the option of the Testing Party, from an excavated satellite hole, they shall be extracted during drilling from each of no more than 10 holes drilled at stations specified by Designated Personnel. The diameter of each drilled hole shall be no less than 0.09 meters and no more than 0.15 meters, and the depth of each hole shall be no more than the diameter of the emplacement hole or satellite hole at this station. Core samples shall be extracted at locations specified by Designated Personnel along each drilled hole. If core samples are extracted from a drilled satellite hole, they shall be extracted by personnel of the Testing Party during the drilling of the satellite hole, within each hydrodynamic measurement zone, at no more than 10 stations specified by Designated Personnel and under their observation. Rock fragments shall be extracted from the emplacement hole or an excavated satellite hole at each of no more than 10 stations specified by Designated Personnel. Core samples and rock fragments may be taken from no more than a total of 10 stations. If an emplacement hole or an excavated satellite hole is lined at any station specified by Designated Personnel for extracting core samples or rock fragments, personnel of the Testing Party shall enable Designated Personnel to extract core samples or rock fragments at such a station from native rock. The total volume of core samples or rock fragments

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extracted at each station shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree;

(f) core samples or rock fragments may be extracted in accordance with subparagraph (e) of this paragraph by personnel of the Testing Party, under observation of Designated Personnel, or by Designated Personnel, at the option of the Testing Party;

(g) if personnel of the Testing Party do not extract core samples or rock fragments in accordance with subparagraph (e) of this paragraph, Designated Personnel shall have the right, using their own equipment, to extract such core samples or rock fragments in accordance with subparagraph (e) of this paragraph, under observation of personnel of the Testing Party;

(h) if an emplacement hole is vertical, and if the Testing Party, prior to arrival of Designated Personnel at the test site:

(i) has cased a total of 20 meters or more of the emplacement hole or the satellite hole within any hydrodynamic measurement zone, Designated Personnel shall have the right to carry out, in the uncased hole, the activities specified in subparagraph (c)(ii) of this paragraph and to receive core samples or rock fragments from the uncased hole, extracted in accordance with subparagraphs (e), (f), and (g) of this paragraph; or

(ii) has cased a total of 20 meters or more of both the emplacement hole and the satellite hole within any hydrodynamic measurement zone, the Testing Party shall provide an uncased hole with respect to which Designated Personnel shall have the same rights as those specified for the emplacement hole and the satellite hole in subparagraphs (c), (e), (f), and (g) of this paragraph. The axis of this uncased hole shall be within 22 meters of the axes of the emplacement hole and the satellite hole within each hydrodynamic measurement zone. If personnel of the Testing Party, under observation of Designated Personnel, extract core samples through coring during the drilling of this uncased hole, the diameter of the hole

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shall be no less than 0.09 meters. If Designated Personnel, under observation of personnel of the Testing Party, extract core samples from this uncased hole following drilling, the diameter of the uncased hole shall be no less than 0.3 meters;

(i) Designated Personnel shall have the right to retain core samples and rock fragments specified in subparagraphs (e), (f), (g), and (h) of this paragraph. Any such core samples or rock fragments shall be prepared in accordance with procedures agreed upon by the Parties for shipment to the territory of the Verifying Party; and

(j) logging, directional surveys, geodetic measurements, and extracting of core samples or rock fragments carried out in accordance with subparagraphs (c), (e), (f), (g), (h), and (i) of this paragraph shall begin at times chosen by the Testing Party and specified in the coordinated schedule. Designated Personnel shall have the right, within a period not to exceed 21 days, to carry out logging, directional surveys, geodetic measurements, and coring activities, unless the Parties otherwise agree and so specify in the coordinated schedule. The Testing Party shall not emplace any explosive until the activities specified in this paragraph have been completed.

6. With respect to any explosion having a planned yield exceeding 50 kilotons and characteristics differing from those set forth in paragraph 2 or 3 of this Section with respect to a test of standard configuration:

(a) personnel of the Testing Party, using their own equipment and at a time of their own choosing, shall drill or excavate up to three satellite holes associated with the emplacement hole. The location of the satellite holes shall be determined in accordance with paragraph 11(b)(i) of Section XI of this Protocol. The Testing Party shall have the right to complete drilling or excavation of satellite holes for the specific test prior to the arrival of Designated Personnel at the test site for that test. The satellite holes shall meet the following requirements:

(i) with respect to the first satellite hole, its length shall be as specified in paragraph 4(a)(ii) of this Section;

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(ii) with respect to the second and third satellite holes, if such are required by the Verifying Party, the axis of each satellite hole shall be within three meters of the axis specified by the Verifying Party. Its length shall be specified by the Verifying Party and in no case shall it extend beyond the hydrodynamic measurement zone associated with that explosion;

(iii) within each hydrodynamic measurement zone, the axis of each satellite hole shall be essentially parallel to the axis of the emplacement hole, if the emplacement hole is vertical, or shall be essentially straight, if the emplacement hole is horizontal. Within each hydrodynamic measurement zone, its axis shall be no less than eight meters from the axis of the emplacement hole, if the emplacement hole is vertical, or no less than 10 meters from the axis of the emplacement hole, if the emplacement hole is horizontal, and no less than six meters from the wall of any drilled or excavated cavity or hole;

(iv) with respect to a drilled satellite hole, it shall be drilled no less than 0.3 meters and no more than 0.5 meters in diameter, unless the Parties otherwise agree. Within each hydrodynamic measurement zone, no washouts shall penetrate more than one meter into the wall of the hole;

(v) with respect to an excavated satellite hole, it shall have a cross section, measured in the plane perpendicular to its axis, no greater than 2.5 meters by 2.5 meters within each hydrodynamic measurement zone; and

(vi) within each hydrodynamic measurement zone, except for any drilled or excavated cavity or hole, all voids, external and unconnected to any satellite hole, greater than 10 cubic meters in volume, within six meters of the axis of any satellite hole, and all voids greater than one cubic meter in volume, within two meters of the axis of any satellite hole, shall be filled with stemming material having a bulk density no less than 70 percent of the average density of the surrounding rock;

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(b) Designated Personnel shall have the right to carry out, under observation of personnel of the Testing Party and with their assistance, if such assistance is requested by Designated Personnel, directional surveys and geodetic measurements of each satellite hole and emplacement hole prior to the beginning of emplacement of sensing elements and cables and transducers;

(c) equipment specified in paragraph 3 of Section VIII of this Protocol shall be operated by Designated Personnel and shall be installed, in accordance with installation instructions provided in accordance with paragraph 6(c) of Section VIII of this Protocol, by Designated Personnel under observation of personnel of the Testing Party and with their assistance, if such assistance is requested by Designated Personnel. The location of each hydrodynamic recording facility and the command and monitoring facility of the Verifying Party and the instrumentation facility of the Testing Party specified in paragraph 10(1) of this Section shall be determined by the Testing Party in consultation with the Verifying Party in the Coordinating Group no less than 90 days prior to the beginning of emplacement of sensing elements and cables. Areas for the installation of these facilities, cable supports, and cableways for protection of cables of the Verifying Party specified in paragraphs 3(b), 3(f), and 3(g) of Section VIII of this Protocol shall be prepared by the Testing Party in accordance with requirements agreed upon in the Coordinating Group. Only cables of the Verifying Party shall be installed in these cableways. Designated Personnel shall have access, under observation of personnel of the Testing Party, to the cables specified in paragraphs 3(f) and 3(g) of Section VIII of this Protocol and to the cableways in which they are installed, at all times. Personnel of the Testing Party shall have access to these cableways only under observation of Designated Personnel;

(d) Designated Personnel shall have the right to use their own primary electrical power sources to supply electrical power to hydrodynamic equipment specified in paragraph 3 of Section VIII of this Protocol. At the request of the Verifying Party, the Testing Party shall supply electrical power from the standard electrical network of its test site through converters provided by the Verifying Party or, upon agreement of the Parties, by the Testing Party;

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(e) for each test, the only equipment installed in each satellite hole shall be that of the Verifying Party specified in paragraphs 3(a) and 3(h) of Section VIII of this Protocol. This equipment shall be installed in each satellite hole at the locations specified by Designated Personnel. Designated Personnel shall have the right to install in each satellite hole no more than six sensing elements and cables, without regard to the number of switches, and no more than six transducers together with no more than 14 cables for information transmission and power supply. The total number of cables in each satellite hole shall not exceed 20. Personnel of each Party shall have the right to measure the location of the installed sensing elements and cables and transducers;

(f) Designated Personnel shall have the right to conduct a final directional survey and geodetic measurements of each satellite hole upon completion of installation of sensing elements and cables and transducers;

(g) personnel of the Testing Party, under observation of Designated Personnel, shall fill all voids in or connected to each satellite hole within each hydrodynamic measurement zone with a stemming material agreed upon by the Parties, having a bulk density no less than 70 percent of the average density of the surrounding rock. A representative sample of no less than 1000 cubic centimeters in volume of each stemming material used in each hydrodynamic measurement zone shall be provided to Designated Personnel for retention. The methods and materials used for stemming satellite holes and any hydrodynamic measurement equipment emplacement pipe shall:

(i) be consistent with the containment practices of the Testing Party;

(ii) be chosen to minimize voids around sensing elements and cables and transducers; and

(iii) be chosen to avoid damage to the sensing elements and cables and transducers;

(h) Designated Personnel shall have the right to observe the stemming of the hydrodynamic measurement zones of each emplacement hole in accordance with paragraph 9(d) of this Section. A

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representative sample of no less than 1000 cubic centimeters in volume of each stemming material used in each hydrodynamic measurement zone shall be provided to Designated Personnel for retention;

(i) the Testing Party shall have the right to case or line each emplacement hole; and

(j) the Testing Party shall have the right to case or line each satellite hole, provided that:

(i) sensing elements and cables and transducers can be installed as specified in subparagraph (e) of this paragraph;

(ii) casing or lining material in each hydrodynamic measurement zone is agreed upon by the Parties; and

(iii) casing or lining in each hydrodynamic measurement zone is affixed to the surrounding formation with material agreed upon by the Parties.

7. In preparation for the use of the hydrodynamic yield measurement method with respect to any explosion having a planned yield exceeding 50 kilotons and characteristics differing from those set forth in paragraph 2 or 3 of this Section with respect to a test of standard configuration:

(a) upon their arrival at the test site, no less than 10 days prior to the planned date of the beginning of emplacement of sensing elements and cables and transducers, Designated Personnel shall provide the Testing Party with a description of the recording format and the computer program, to enable the Testing Party to read digital data if digital recordings of hydrodynamic data will be made by Designated Personnel;

(b) the Testing Party shall provide Designated Personnel upon their arrival at the test site with the results of any studies of core samples and rock fragments extracted from each emplacement hole and satellite hole and any exploratory holes and tunnels, and the results of logging and geodetic measurements carried out in each emplacement hole, each satellite hole, and any exploratory holes and tunnels, relevant to the geology and geophysics of each hydrodynamic measurement zone, if the Testing Party carried out such studies and measurements;

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(c) using their own equipment and under observation of personnel of the Testing Party, Designated Personnel shall have the right to carry out:

(i) if an emplacement hole is vertical, in the emplacement hole and each associated satellite hole, caliper logs, directional surveys, geodetic measurements, and depth or distance measurements to determine the dimensions and the relative locations of the emplacement hole and each satellite hole, as well as measurements to determine the location and volume of all voids within each hydrodynamic measurement zone, using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding;

(ii) if an emplacement hole is vertical, within the hydrodynamic measurement zones of the emplacement hole and each associated satellite hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, acoustic, and television logging;

(iii) if an emplacement hole is horizontal, in the emplacement hole and each associated satellite hole, as well as in the drilled holes specified in subparagraph (e)(ii) of this paragraph, caliper logs, directional surveys, geodetic measurements, and distance measurements to determine the dimensions and relative location of these holes, as well as measurements to determine the location and volume of all voids in each hydrodynamic measurement zone using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding;

(iv) if an emplacement hole is horizontal, in the drilled holes specified in subparagraph (e)(ii) of this paragraph, and within the hydrodynamic measurement zones of the emplacement hole and each associated satellite hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, and acoustic logging; and

(v) magnetic surveys, in vertical satellite holes and drilled horizontal

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satellite holes, to obtain information necessary for the installation and positioning of transducers;

(d) all logging data and geometrical measurements obtained by Designated Personnel, in accordance with subparagraph (c) of this paragraph, including calibration data, shall be duplicated, and a copy of the data shall be provided to personnel of the Testing Party prior to departure from the test site of Designated Personnel who have carried out these measurements. Calibration data shall include information necessary to confirm the sensitivity of logging equipment under the conditions in which it is used;

(e) Designated Personnel shall have the right to receive:

(i) if an emplacement hole is vertical, core samples or, at the option of Designated Personnel, rock fragments from the emplacement hole and from each satellite hole, extracted at no more than 10 depths within each hydrodynamic measurement zone, specified by Designated Personnel. The total volume of core samples or rock fragments extracted at each depth shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree; and

(ii) if an emplacement hole is horizontal, core samples or, at the option of Designated Personnel, rock fragments from the emplacement hole and each satellite hole within each hydrodynamic measurement zone. If core samples are extracted from the emplacement hole or an excavated satellite hole, they shall be extracted during drilling from each of no more than 10 holes drilled at stations specified by Designated Personnel. The diameter of each drilled hole shall be no less than 0.09 meters and no more than 0.15 meters, and the depth of each hole shall be no more than the diameter of the emplacement hole or satellite hole at this station. Core samples shall be extracted at locations specified by Designated Personnel along each drilled hole. If core samples are extracted from a drilled satellite hole, they shall be extracted by personnel of the Testing Party during the drilling of the satellite hole, within each hydrodynamic measurement

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zone, at no more than 10 stations specified by Designated Personnel and under their observation. Rock fragments shall be extracted from the emplacement hole or an excavated satellite hole at each of no more than 10 stations specified by Designated Personnel. Core samples and rock fragments may be taken from no more than a total of 10 stations for each hole. If an emplacement hole or an excavated satellite hole is lined at any station specified by Designated Personnel for extracting core samples or rock fragments, personnel of the Testing Party shall enable Designated Personnel to extract core samples or rock fragments at such a station from native rock. The total volume of core samples or rock fragments extracted at each station shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree;

(f) core samples or rock fragments may be extracted in accordance with subparagraph (e) of this paragraph by personnel of the Testing Party, under observation of Designated Personnel, or by Designated Personnel, at the option of the Testing Party;

(g) if personnel of the Testing Party do not extract core samples or rock fragments in accordance with subparagraph (e) of this paragraph, Designated Personnel shall have the right, using their own equipment, to extract such core samples or rock fragments in accordance with subparagraph (e) of this paragraph, under observation of personnel of the Testing Party;

(h) if an emplacement hole is vertical, and if the Testing Party, prior to arrival of Designated Personnel at the test site, has cased a total of 20 meters or more of the emplacement hole or any satellite hole within any hydrodynamic measurement zone, and if within 22 meters from this cased hole there is no uncased hole with a diameter no less than 0.3 meters, the Testing Party shall provide an uncased hole for each hole so cased, with respect to which the Verifying Party shall have the same rights as those specified in subparagraphs (c), (e), (f), and (g) of this paragraph. Within each hydrodynamic measurement zone the axis of each uncased hole shall be no less than 11 and no more than 22 meters from such a cased hole. If personnel of the Testing

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Party, under observation of Designated Personnel, extract core samples through coring during the drilling of this uncased hole, the diameter of the hole shall be no less than 0.09 meters. If Designated Personnel, under observation of personnel of the Testing Party, extract core samples from this uncased hole following drilling, the diameter of the uncased hole shall be no less than 0.3 meters;

(i) Designated Personnel shall have the right to retain core samples and rock fragments specified in subparagraphs (e), (f), (g), and (h) of this paragraph. Any such core samples or rock fragments shall be prepared in accordance with procedures agreed upon by the Parties for shipment to the territory of the Verifying Party; and

(j) logging, directional surveys, magnetic surveys, geodetic measurements, and extracting of core samples or rock fragments carried out in accordance with subparagraphs (c), (e), (f), (g), (h), and (i) of this paragraph shall begin at times chosen by the Testing Party and specified in the coordinated schedule. Designated Personnel shall have the right, within a period not to exceed 25 days, to carry out logging, directional surveys, magnetic surveys, geodetic measurements, and coring activities, unless the Parties otherwise agree and so specify in the coordinated schedule. The Testing Party shall not emplace any explosive until the activities specified in this paragraph have been completed.

8. If the Verifying Party has notified the Testing Party that it intends to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration having a planned yield exceeding 50 kilotons, and that it requires a reference test in accordance with paragraph 7 of Section III of this Protocol, the Testing Party shall provide for such a reference test for the non-standard test. To serve as a reference test, a test shall:

- (a) have a planned yield exceeding 50 kilotons;
- (b) be of standard configuration;
- (c) have a single explosive canister;
- (d) meet the following spacing criteria:

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(i) the horizontal separation between the emplacement point of the reference test and each emplacement point of the non-standard test at which any explosive canister or its emplacement conditions differ from those specified for a test of standard configuration shall be no less than 300 meters and no more than 2000 meters;

(ii) each explosive canister of the test of non-standard configuration and the explosive canister of the associated reference test shall all be emplaced above the water table or shall all be emplaced below the water table; and

(iii) the depth of all emplacement points of the test of non-standard configuration shall be within 150 meters of the depth of the emplacement point of its associated reference test; and

(e) be conducted either prior to, or within 12 months following, the conduct of the test of non-standard configuration for which it serves as a reference test.

9. Designated Personnel shall have the right:

(a) to have access along agreed routes to the location of the test to carry out activities related to use of the hydrodynamic yield measurement method;

(b) to have access to their equipment associated with the hydrodynamic yield measurement method from the time of its delivery to Designated Personnel at the test site, until it is transferred to personnel of the Testing Party in accordance with paragraph 7(i) of Section VIII of this Protocol, unless otherwise provided in this Protocol;

(c) with respect to a test of standard configuration, as well as with respect to any explosion having a planned yield of 50 kilotons or less:

(i) if an emplacement hole is vertical, prior to the lowering of the explosive canister into the emplacement hole, to confirm by direct measurement the external dimensions of each explosive canister; to inspect visually the entire external structure of that canister and the choke section; to confirm by direct

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measurement that the choke section conforms to the specifications set forth in paragraph 2(c) of this Section; to observe continuously the explosive canister and any choke section from the time inspections and measurements, carried out in accordance with this subparagraph, begin; to observe the emplacement of the explosive canister into the emplacement hole and stemming of the emplacement hole from the time the entire explosive canister is last visible above the entrance of the emplacement hole until completion of stemming of each hydrodynamic measurement zone of the emplacement hole; to determine by direct measurement the depth of emplacement of the bottom part of any choke section; and to observe the stemming of the entire satellite hole; and

(ii) if an emplacement hole is horizontal, following placement of explosive canisters in the emplacement hole, and prior to the beginning of stemming around explosive canisters, to confirm by direct measurement the external dimensions of each explosive canister; to inspect visually the entire external structure of each explosive canister; to confirm by direct measurement that each choke section conforms to the specifications set forth in paragraph 3(e) of this Section; to observe continuously each explosive canister and each choke section from the time inspections and measurements, carried out in accordance with this subparagraph, begin, until the completion of stemming around each explosive canister and choke section, or, at the option of the Testing Party, until the explosive canister and choke section are fixed in place with solidified stemming material, in which case, after a period of no more than 24 hours for placement of explosives, to observe the explosive canister, the choke section, and the completion of stemming around each explosive canister and choke section; and to observe the stemming of each hydrodynamic measurement zone of the emplacement hole, the stemming of any access or bypass drifts, the stemming of any voids in each hydrodynamic measurement zone connected to the emplacement hole; and to observe the entire stemming of each associated satellite hole;

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(d) with respect to any explosion having a planned yield exceeding 50 kilotons and characteristics differing from those set forth in paragraph 2 or 3 of this Section with respect to a test of standard configuration:

(i) if an emplacement hole is vertical, prior to the lowering of an explosive canister into the emplacement hole, to confirm by direct measurement the external dimensions of each explosive canister; to inspect visually the external structure of each canister and each choke section; to confirm by direct measurement that each choke section conforms to any specifications provided by the Testing Party in accordance with paragraph 10(c)(iii) of Section XI of this Protocol; to observe continuously each explosive canister and each choke section from the time inspections and measurements, carried out in accordance with this subparagraph, begin; to observe the emplacement of each explosive canister into the emplacement hole and stemming of the emplacement hole from the time an entire explosive canister is last visible above the entrance of the emplacement hole until completion of stemming of each hydrodynamic measurement zone of the emplacement hole; to determine by direct measurement the depth of emplacement of the upper surface of each explosive canister; and to observe the entire stemming of each associated satellite hole;

(ii) if an emplacement hole is horizontal, following placement of all explosive canisters in the emplacement hole and prior to the beginning of stemming around the explosive canister, to confirm by direct measurement the external dimensions of each explosive canister; to inspect visually the entire external structure of each explosive canister; to confirm by direct measurement that each choke section conforms to any specifications provided by the Testing Party in accordance with paragraph 10(c)(iii) of Section XI of this Protocol; to observe continuously each explosive canister and each choke section from the time inspections and measurements, carried out in accordance with this subparagraph, begin, until the completion of stemming around each explosive canister and choke section, or, at the option of the Testing Party, until the

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explosive canister and choke section are fixed in place with solidified stemming material, in which case, after a period of no more than 24 hours for placement of explosives, to observe the explosive canister, the choke section, and the completion of stemming around each explosive canister and choke section; to observe the stemming of each hydrodynamic measurement zone of the emplacement hole, the stemming of any access or bypass drifts, the stemming of any voids in each hydrodynamic measurement zone connected to the emplacement hole, except those voids and any access or bypass drifts designated by the Testing Party to remain unstemmed in accordance with paragraph 10(c) of Section XI of this Protocol; and to observe the entire stemming of each associated satellite hole; and

(iii) if a test is conducted in a cavity, to measure the shape and volume of the cavity after excavation and once again immediately prior to placement of explosive canisters with explosives or placement of explosives into explosive canisters. After placement of explosive canisters with explosives or placement of explosives into explosive canisters, Designated Personnel shall have the right to observe explosive canisters and to observe the stemming of each hydrodynamic measurement zone of the emplacement hole and any access or bypass drifts, and of any voids connected to the emplacement hole, within each hydrodynamic measurement zone, except those voids and any access or bypass drifts designated by the Testing Party to remain unstemmed, in accordance with paragraph 10(c) of Section XI of this Protocol; and to observe the entire stemming of each associated satellite hole;

(e) with respect to a test of standard configuration, as well as with respect to any explosion having a planned yield of 50 kilotons or less:

(i) if an emplacement hole is vertical, to unobstructed visual observation of the entrance to the emplacement hole and associated satellite hole from completion of stemming of the satellite hole and of the hydrodynamic measurement zones of the emplacement hole until

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departure of all personnel from the test location prior to the test; and

(ii) if an emplacement hole is horizontal, to unobstructed visual observation of sensing elements and cables until completion of stemming of each associated satellite hole, and of cables specified in paragraph 3(b) of Section VIII of this Protocol until completion of their installation in protective cableways specified in paragraph 4(d) of this Section, as well as observation of the entrance to the emplacement hole from completion of stemming of each satellite hole and of the hydrodynamic measurement zones of the emplacement hole until departure of all personnel from the test location prior to the test;

(f) with respect to any explosion having a planned yield exceeding 50 kilotons and characteristics differing from those set forth in paragraph 2 or 3 of this Section with respect to a test of standard configuration:

(i) if an emplacement hole is vertical, to unobstructed visual observation of the entrance to the emplacement hole and each satellite hole from completion of stemming of all satellite holes and the hydrodynamic measurement zones of the emplacement hole until departure of all personnel from the test location prior to the test; and

(ii) if an emplacement hole is horizontal, to unobstructed visual observation of the sensing elements and cables and transducers until completion of stemming of all associated satellite holes, and of cables specified in paragraph 3(b) of Section VIII of this Protocol until completion of their installation in protective cableways specified in paragraph 6(c) of this Section of the Protocol, as well as the entrance to the emplacement hole from completion of stemming of all satellite holes and the hydrodynamic measurement zones of the emplacement hole until departure of all personnel from the test location prior to the test;

(g) to monitor electrically the integrity and performance of their equipment specified in paragraphs 3(a), 3(b), 3(c), 3(d), 3(e), 3(f), and

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3(g) of Section VIII of this Protocol and to observe continuously the cables specified in paragraphs 3(f) and 3(g) of Section VIII of this Protocol and the cableways in which they are installed as specified in paragraphs 4(d) and 6(c) of this Section, from the time emplacement of sensing elements and cables and transducers begins until departure of all personnel from the test location. Following departure of personnel and until reentry of personnel to the test location following the test, Designated Personnel shall have the right to observe remotely, by means of closed-circuit television, the surface area containing their hydrodynamic yield measurement equipment;

(h) to monitor electrically the integrity and performance of their equipment specified in paragraphs 3(a), 3(b), 3(c), 3(d), 3(f), and 3(g) of Section VIII of this Protocol from the command and monitoring facility specified in paragraph 3(e) of Section VIII of this Protocol, from commencement of its use by Designated Personnel until completion of the activities specified in paragraphs 9(m) and 14(b) of this Section;

(i) to transmit from the command and monitoring facility to each hydrodynamic recording facility the commands required for operation of that hydrodynamic recording facility;

(j) to use channels provided by the Testing Party within its telemetry system for transmission of information specified in subparagraphs (h), (i), (k), and (l) of this paragraph, if such a system is used at the test site of the Testing Party, or to use for these purposes its own cables, specified in paragraph 3(g) of Section VIII of this Protocol;

(k) to carry out hydrodynamic yield measurements and to record the hydrodynamic data;

(l) to transmit the hydrodynamic yield measurement data from each hydrodynamic recording facility to the command and monitoring facility; and

(m) to reenter the area containing each hydrodynamic recording facility at the same time as personnel of the Testing Party, and to have access, in accordance with procedures agreed upon by the Parties and accompanied by personnel of the Testing Party, to each hydrodynamic recording facility, for the purposes of retrieving and verifying the

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authenticity of recorded data and assessing the performance of the equipment of the Verifying Party during data recording and transmission.

10. During the carrying out of hydrodynamic yield measurements:

(a) the Representative of the Testing Party shall notify, in writing, the Designated Personnel Team Leader at the test site of the beginning of the period of readiness and the planned time of the test, in accordance with paragraph 13 of Section IV of this Protocol;

(b) the Testing Party shall produce an event readiness signal in the interval from seven to 15 minutes prior to the planned time of the test, as specified by the Verifying Party, with an accuracy of plus or minus 100 milliseconds. The parameters for this signal, produced by the Testing Party, and procedures for its transmission and reception shall be agreed upon by the Parties;

(c) Designated Personnel shall have the right to generate, using the trigger conditioner devices approved by the Parties, a timing reference signal using an electromagnetic pulse from their sensing elements and cables. This timing reference signal shall be generated, transmitted, and used by Designated Personnel without intervention by personnel of the Testing Party. For each explosion in a test, the trigger conditioner shall receive signals from one or two hydrodynamic yield measurement cables;

(d) Designated Personnel, under observation of personnel of the Testing Party, shall have the right to install the trigger conditioner devices. From the time of installation of these devices until the time of the test:

(i) Designated Personnel shall have the right to test and monitor the operation of the devices;

(ii) personnel of the Testing Party shall have the right to monitor the operation of the devices and to monitor and record the timing reference signal; and

(iii) neither Designated Personnel nor personnel of the Testing Party shall have

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physical access to the devices, except under observation of personnel of the other Party;

(e) the Testing Party shall provide, at the request of the Verifying Party, an electrical pulse corresponding to the nuclear explosion zero-time, with an accuracy of plus or minus one microsecond, for each explosion. The parameters for this signal and procedures for its transmission and reception shall be agreed upon by the Parties;

(f) the Testing Party shall have exclusive control over the generation of signals specified in subparagraphs (b) and (e) of this paragraph;

(g) Designated Personnel, under observation of personnel of the Testing Party, shall install in each cable from each satellite hole to a hydrodynamic recording facility an anti-intrusiveness device for interrupting the transmission, from the sensing elements and cables and transducers to the hydrodynamic recording facility of the Verifying Party, of any signal unrelated to hydrodynamic yield measurements. These devices shall be provided by the Testing Party from among those approved by both Parties and shall not interfere with the ability of Designated Personnel to record data required for hydrodynamic yield measurements of each explosion in a test. From the time of installation of these devices until the final dry run, personnel of each Party shall have the right to test and monitor the operation of the devices and to have physical access to them only under observation of personnel of the other Party. Sole control over the triggering of these devices shall be transferred to the Testing Party at the time of departure of all personnel from the test location prior to the test;

(h) each hydrodynamic recording facility shall have an independent grounding loop with an impedance no greater than 10 ohms;

(i) the shields of all cables associated with sensing elements and cables and transducers of the Verifying Party shall be grounded:

(i) at the input to each hydrodynamic recording facility of the Verifying Party;

(ii) at the output of each anti-intrusiveness device;

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(iii) at the input of each trigger conditioner device; and

(iv) in those cables associated with sensing elements and cables in which no trigger conditioner device is installed, at the input of the anti-intrusiveness device;

(j) grounding of each hydrodynamic recording facility, as well as grounding of cables associated with the sensing elements and cables and transducers of the Verifying Party, shall be carried out by Designated Personnel under observation of personnel of the Testing Party. The grounding system of each hydrodynamic recording facility, as well as of cables associated with the sensing elements and cables and transducers shall be under the joint control of the Parties;

(k) Designated Personnel shall have the right to install, under observation of personnel of the Testing Party, an isolation transformer at the input of each anti-intrusiveness device or trigger conditioner device. From the time of installation of these devices until the time of the test, neither Designated Personnel nor personnel of the Testing Party shall have physical access to these devices, except under observation of personnel of the other Party;

(l) the Testing Party shall have the right to install, at a distance of no less than 50 meters from each hydrodynamic recording facility, a facility containing instrumentation for monitoring and recording the timing reference signal, for controlling and monitoring the operation of the anti-intrusiveness devices, and for the transmission of control and trigger signals. Signals between the instrumentation facility of the Testing Party and each hydrodynamic recording facility shall be transmitted over fiber optic cables. The Testing Party shall provide for the installation, in each hydrodynamic recording facility, of terminal devices for converting optical signals into electrical signals produced in accordance with subparagraphs (b) and (e) of this paragraph, and for monitoring the interval of interruption and for monitoring the power supply of the anti-intrusiveness device, in accordance with subparagraph (g) of this paragraph. The Verifying Party shall provide for the installation in the facility of the Testing Party of a terminal device for converting an optical signal

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into an electrical time referencing signal provided in accordance with subparagraph (d)(ii) of this paragraph. These provided devices shall be installed under observation of personnel of both Parties and sealed by the Party providing the device. The instrumentation facilities specified in this subparagraph shall be under the exclusive control of the Testing Party; and

(m) upon arrival at the test site, Designated Personnel shall provide the Testing Party with a copy of the block diagram of the equipment configuration for hydrodynamic yield measurements for the test together with notification of any changes from the block diagram approved during the familiarization process provided in paragraph 6(d)(i) of Section VIII of this Protocol. No less than two days prior to the final dry run, Designated Personnel shall notify the Testing Party, in writing, of any additional changes in this block diagram. In the event of any changes in the block diagram, the Testing Party shall have the right, within one day following such notification, to disapprove any changes it finds inconsistent with its non-intrusiveness, containment, safety, or security requirements. Such disapproval shall be provided, in writing, to the Designated Personnel Team Leader, stating the specific reasons for disapproval. Any changes not disapproved shall be deemed accepted. If a change is disapproved, Designated Personnel shall configure the equipment in accordance with the block diagram previously approved in accordance with paragraph 6(d)(i) of Section VIII of this Protocol, unless the Testing Party otherwise agrees.

11. Personnel of the Testing Party shall have the right to observe use of equipment by Designated Personnel at the test site, with access to each hydrodynamic recording facility and the command and monitoring facility of the Verifying Party subject to the following:

(a) at any time prior to the test that Designated Personnel are not present in these facilities, these facilities shall be sealed by the seals of both Parties. Seals shall be removed only under observation of personnel of both Parties;

(b) prior to the test, except for periods specified in subparagraphs (c) and (d) of this paragraph, personnel of the Testing Party may enter

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these facilities only with the agreement of the Designated Personnel Team Leader and when accompanied by the Team Leader or his designated representative;

(c) for the period of two hours prior to the final dry run, and for the period of two hours prior to the time fixed for withdrawal of all personnel to the area designated for occupation during the test, personnel of the Testing Party, not to exceed two, shall have the right to join Designated Personnel in each hydrodynamic recording facility, to observe final preparations of the equipment and to confirm the agreed configuration of that equipment. All personnel shall leave the facility together; and

(d) for a period beginning two hours prior to a test and ending upon completion of the activities specified in paragraphs 9(m) and 14(b) of this Section, personnel of the Testing Party, not to exceed two, shall have the right to join Designated Personnel in the command and monitoring facility to observe final command and monitoring of the recording equipment and acquisition and duplication of data, and to receive a copy of these data.

12. Designated Personnel shall have the right to obtain photographs taken by personnel of the Testing Party using photographic cameras of the Testing Party or, at the option of the Testing Party, photographic cameras provided by the Verifying Party. These photographs shall be taken under the following conditions:

(a) the Testing Party shall identify those of its personnel who will take photographs;

(b) photographs shall be taken at the request and under observation of Designated Personnel. If requested by Designated Personnel, such photographs shall show the size of an object by placing a measuring scale, provided by Designated Personnel, alongside that object during the photographing;

(c) Designated Personnel shall determine whether photographs conform to those requested, and, if not, repeat photographs shall be taken; and

(d) before completion of any photographed operation related to emplacement, and prior to the time at which an object that is being photographed becomes permanently hidden from view, Designated Personnel shall determine whether requested

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photographs are adequate. If they are not adequate, before the operation shall proceed additional photographs shall be taken until the Designated Personnel determine that the photographs of that operation are adequate. This photographic process shall be undertaken as expeditiously as possible, and in no case shall the cumulative delay resulting from this process exceed two hours for each of the operations specified in paragraphs 13(a), 13(b), 13(d), 13(e), and 13(f) of this Section, unless the Parties otherwise agree, except that stemming shall not be interrupted as a result of the photographic process.

13. Designated Personnel shall have the right to obtain photographs, taken in accordance with paragraph 12 of this Section, of the following:

(a) the emplacement and installation of equipment associated with the hydrodynamic yield measurement method, including all sensing elements and cables and transducers and their connections, each hydrodynamic recording facility, the command and monitoring facility, anti-intrusiveness devices, and trigger conditioner devices;

(b) the stemming of all satellite holes;

(c) all choke sections and the exterior of each explosive canister;

(d) if an emplacement hole is vertical, the emplacement of each explosive canister and the stemming of the hydrodynamic measurement zones of the emplacement hole;

(e) if an emplacement hole is horizontal, the interior of the emplacement hole within 20 meters of the emplacement point of each installed explosive canister and the stemming of hydrodynamic measurement zones of the emplacement hole;

(f) core samples and rock fragments obtained in accordance with paragraphs 5(e), 5(f), 5(g), 5(h), 7(e), 7(f), 7(g), and 7(h) of this Section, the equipment and activities associated with extracting such samples, as well as the interior of the emplacement hole, if an emplacement hole is horizontal, at the stations where core samples or rock fragments were extracted; and

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(g) with the agreement of the Testing Party, other activities of Designated Personnel directly related to the use of the hydrodynamic yield measurement method.

14. The following procedures shall apply to the recovery and transfer of data:

(a) no later than the final dry run, Designated Personnel shall inform personnel of the Testing Party of the procedures for recovering and verifying the authenticity of data and shall advise personnel of the Testing Party, at the time of data recovery, of any changes Designated Personnel make in those procedures and the reasons for such changes;

(b) following the test, Designated Personnel, in the presence of personnel of the Testing Party, shall enter the hydrodynamic recording facility and recover all recordings of data taken at the time of the test. Designated Personnel shall prepare two identical copies of such data. Personnel of the Testing Party shall select one of the two identical copies. Designated Personnel shall retain the other copy, but no other such data; and

(c) following the completion of the activities specified in paragraph 9(m) of this Section and subparagraph (b) of this paragraph, Designated Personnel shall leave the hydrodynamic recording facility and the command and monitoring facility at the same time as personnel of the Testing Party. Designated Personnel shall have no further access to their hydrodynamic recording facility, command and monitoring facility, or equipment until these are returned to the Verifying Party in accordance with paragraph 7(i)(ii) of Section VIII of this Protocol, unless the Parties otherwise agree, in which case access by Designated Personnel to their facilities and equipment shall be under observation of personnel of the Testing Party.

15. Designated Personnel shall not be present in areas from which all personnel of the Testing Party have been withdrawn in connection with the test, but shall have the right to reenter those areas, as provided in this Protocol, at the same time as personnel of the Testing Party.

16. All hydrodynamic yield measurement activities shall be carried out in accordance with the coordinated schedule. Designated Personnel who will carry out the

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activities specified in this Section and in paragraph 7(e) of Section VIII of this Protocol shall arrive at the test site in accordance with the coordinated schedule, but no less than three days prior to the date specified by the Testing Party for the beginning of these activities.

17. The number of Designated Personnel carrying out hydrodynamic yield measurements with respect to a test of standard configuration conducted in a single emplacement hole, without regard to the number of ends of that emplacement hole, as these are specified in paragraph 3(b) of this Section, shall not exceed, at any time, 35 individuals, and the number of Designated Personnel, at any time, carrying out hydrodynamic yield measurements with respect to a test of non-standard configuration or a test conducted in more than one emplacement hole shall not exceed, at any time, 45 individuals, unless the Parties otherwise agree. Within these totals, the coordinated schedule shall be developed so as to ensure that the number of Designated Personnel for carrying out hydrodynamic yield measurements with respect to a specific test shall not exceed:

(a) if a test is of standard configuration, for carrying out activities related to hydrodynamic yield measurements, other than activities specified in paragraph 5(j) of this Section, 26 individuals and, for carrying out activities specified in paragraph 5(j) of this Section:

(i) if an emplacement hole is vertical, 18 individuals; or

(ii) if an emplacement hole is horizontal, 22 individuals; or

(b) if a test is of non-standard configuration or is conducted in more than one emplacement hole, for carrying out activities related to hydrodynamic yield measurements other than activities specified in paragraph 5(j) or 7(j) of this Section, 35 individuals and, for carrying out activities specified in paragraph 5(j) or 7(j) of this Section, 26 individuals; and

(c) Designated Personnel shall include at least two individuals fluent in the language of the Testing Party.

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SECTION VI. SEISMIC YIELD MEASUREMENT METHOD

1. For the purposes of the use of the seismic yield measurement method, the Verifying Party shall have the right to carry out independent seismic measurements at three Designated Seismic Stations in the territory of the Testing Party, in accordance with this Section. Designated Seismic Stations of each Party shall meet the following criteria:

(a) be located within its continental territory;

(b) each shall have an Lg-wave signal-to-noise ratio not less than nine for any test in its territory having a yield of 150 kilotons. The signal-to-noise ratio shall be defined as one-half of the maximum peak amplitude of the Lg-wave signal divided by the root-mean-square value of the seismic noise in the recording segment immediately preceding the arrival of the P-wave signal and having a duration of no less than one minute. The signals and the noise shall be measured on a vertical component of the recording in the frequency range typical of Lg-waves recorded at the Designated Seismic Station;

(c) ensure wide azimuthal coverage of each of its test sites, insofar as permitted by their geographic location; and

(d) be chosen from those existing seismic stations that provide earthquake and other seismic event data, including tests, to archives in the territory of the Testing Party, accessible to the Verifying Party.

2. The United States of America designates the following three seismic stations as meeting the criteria specified in paragraph 1 of this Section: Tulsa, Oklahoma (TUL) (35°55'N; 095°48'W); Black Hills, South Dakota (RSSD)(44°07'N; 104°02'W); and Newport, Washington (NEW) 48°16'N; 117°07'W).

3. The Union of Soviet Socialist Republics designates the following three seismic stations as meeting the criteria specified in paragraph 1 of this Section: Arti (ARU)(56°26'N; 058°34'E); Novosibirsk (NVS)(54°51'N; 083°16'E); and Obninsk (OBN)(55°07'N; 036°34'E).

4. Upon entry into force of the Treaty each Party shall provide the other Party with the following information on each of its Designated Seismic Stations:

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(a) a site diagram of the station showing the areas assigned for use by Designated Personnel;

(b) elevation above mean sea level to the nearest 10 meters; and

(c) types of rock on which it is located.

5. The Testing Party shall have the right to replace one or more of its Designated Seismic Stations, provided:

(a) the new Designated Seismic Station meets all the criteria specified in paragraph 1 of this Section;

(b) notification of the decision of the Testing Party to select a new Designated Seismic Station, together with the station name and its reference code, the station coordinates to the nearest one minute of geographic latitude and longitude, and the information and site diagram for the new station specified in paragraph 4 of this Section, is provided to the Verifying Party no less than 90 days prior to the planned date of any test with respect to which the Verifying Party has notified the Testing Party that it intends to use the seismic yield measurement method and for which this Designated Seismic Station would be used; and

(c) seismic data, for the period from entry into force of the Treaty until the new Designated Seismic Station begins use as a Designated Seismic Station, are placed in archives in the territory of the Testing Party, accessible to the Verifying Party. If a Designated Seismic Station is replaced within the first four years following entry into force of the Treaty, seismic data for at least four years of operation of the new Designated Seismic Station shall be placed in archives in the territory of the Testing Party, accessible to the Verifying Party.

6. If any Designated Seismic Station does not meet the criteria specified in paragraph 1 of this Section, the Verifying Party shall have the right to request its replacement with another Designated Seismic Station that meets such criteria. Any request by the Verifying Party for replacement shall state the reasons this Designated Seismic Station does not meet the criteria specified in paragraph 1 of this Section, and shall be transmitted to the Testing Party through the Nuclear Risk Reduction Centers. If the Parties are unable to resolve the issue of replacement of a Designated Seismic Station, it shall immediately be referred

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to the Bilateral Consultative Commission in accordance with paragraph 1(a) of Section XI of this Protocol for resolution.

7. The Testing Party shall bear the costs of replacing any Designated Seismic Station in its territory, including any costs of eliminating the previous Designated Seismic Station and the costs of preparing a new Designated Seismic Station in accordance with paragraph 6 of this Section.

8. If requested by the Verifying Party, the Testing Party shall provide, according to agreed technical specifications, at each Designated Seismic Station, for the exclusive use of Designated Personnel:

(a) a surface vault and pier for the installation of seismic sensors, to be located not less than 100 meters and not more than 200 meters from the seismometers of the Testing Party, unless the Parties otherwise agree;

(b) a borehole for installation of seismic sensors, to be located not less than 100 meters and not more than 200 meters from the seismometers of the Testing Party, unless the Parties otherwise agree;

(c) a working facility with an area not less than 20 square meters, for the installation and operation of equipment by Designated Personnel and situated not less than 75 meters and not more than 125 meters from the seismometers of the Verifying Party, unless the Parties otherwise agree;

(d) a covered cableway that will allow Designated Personnel to connect devices in the facilities specified in subparagraphs (a), (b), and (c) of this paragraph;

(e) a facility for the storage of shipping containers and spare parts for the use of Designated Personnel while carrying out their activities at the Designated Seismic Stations; and

(f) electrical power from its standard electrical network through converters provided by the Verifying Party or, by agreement of the Parties, by the Testing Party.

9. At each Designated Seismic Station, personnel of the Testing Party shall:

(a) have the right to observe the installation and calibration of equipment by Designated Personnel,

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but at all other times they may be present only at the invitation of the Designated Personnel Team Leader and when accompanied by the Designated Personnel Team Leader or his designated representative;

(b) not interfere with the activities of Designated Personnel with regard to the installation, calibration, adjustment, and operation of equipment; and

(c) provide assistance and logistical support to Designated Personnel in accordance with paragraph 13 of Section XI of this Protocol, and, by agreement of the Parties, other assistance and logistical support requested by Designated Personnel.

10. In carrying out seismic measurements at the Designated Seismic Stations, Designated Personnel shall have the right to:

(a) confirm that the agreed technical specifications for the installation and operation of the equipment have been met during the time periods specified in the coordinated schedule;

(b) have access to their equipment from the time of the arrival of Designated Personnel at, and until their departure from, each Designated Seismic Station, unless otherwise provided in this Protocol;

(c) install, calibrate, adjust, and continuously operate their equipment;

(d) record seismic signals and universal time signals continuously from the time their equipment is installed until two hours after the test, as well as process data to monitor the quality of recorded data and retrieve and copy all recorded data;

(e) use their own electrical sources to supply electrical power to their equipment specified in paragraph 4 of Section VIII of this Protocol;

(f) install and operate tamper-detection equipment and observe the cableway and the exterior of the facility in which the seismic sensors are installed;

(g) assess the integrity and performance of their equipment and confirm that there has been no interference with seismic measurements and the recording of such measurements; and

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(h) lock and seal the facilities specified in paragraphs 8(a), 8(b), 8(c), and 8(e) of this Section with their own seals.

11. The Representative of the Testing Party shall notify, in writing and referenced to Universal Time Coordinated, the Designated Personnel Team Leader at each Designated Seismic Station of the beginning of the period of event readiness and the planned time of the test, to the nearest one second, in accordance with paragraph 13 of Section IV of this Protocol.

12. At each Designated Seismic Station, Designated Personnel shall:

(a) upon arrival, provide the Representative of the Testing Party with a description of the recording format and the computer program to enable the Testing Party to read digital data, if digital recordings of data are made;

(b) prior to departure, provide the Representative of the Testing Party with the following:

(i) a copy of all data recorded by all equipment used by Designated Personnel, on the same medium as that on which these data were recorded;

(ii) a graphic representation on a paper medium of the seismic data of the test for a period of time beginning one minute prior to the test and ending 30 minutes following the test; and

(iii) the results of the calibration of all seismic equipment, including the amplitude-frequency characteristics of the equipment used to measure and record the seismic data; and

(c) prior to their departure, prepare for inspection, storage in accordance with the conditions chosen by the Testing Party, or shipment of their equipment.

13. Designated Personnel shall have the right to acquire photographs of operations and activities related to seismic yield measurement at the Designated Seismic Stations. Photographs shall be taken by personnel of the Testing Party, using their own photographic cameras, or, at the option of the Testing Party, by Designated Personnel using their own photographic cameras.

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(a) If the Testing Party takes photographs, the following conditions shall be met:

(i) the Testing Party shall identify those of its personnel who will take photographs;

(ii) photographs shall be taken at the request and under observation of Designated Personnel. If requested by Designated Personnel, such photographs shall show the size of an object being photographed by placing a measuring scale, provided by Designated Personnel, alongside that object during the photographing; and

(iii) Designated Personnel shall determine whether photographs that were taken conform to those requested, and, if not, repeat photographs shall be taken.

(b) If Designated Personnel take photographs, the following conditions shall be met:

(i) the Verifying Party shall identify those of its Designated Personnel who will take photographs; and

(ii) photographs shall be taken under observation of personnel of the Testing Party, unless otherwise agreed by the Parties.

14. All activities of Designated Personnel at the Designated Seismic Stations shall be carried out in accordance with the coordinated schedule. Designated Personnel shall arrive at the Designated Seismic Stations in accordance with this schedule, but no less than 10 days prior to the planned date of the test. Designated Personnel shall depart the Designated Seismic Station within two days following the test.

15. If the planned date of a test is postponed by more than 10 days following receipt of the most recent notification, Designated Personnel shall have the right to leave the Designated Seismic Stations or, if requested by the Representative of the Testing Party, shall depart the Designated Seismic Stations for a mutually agreed location within the territory of the Testing Party or depart the territory of the Testing Party through the point of entry. If Designated Personnel leave the Designated Seismic Stations, they shall have the right to seal their equipment located at the stations. The seals shall not be broken except by Designated Personnel under observation of personnel of the Testing Party. Designated Personnel shall

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have the right to reoccupy the Designated Seismic Stations no less than 72 hours prior to the next planned time of the test.

16. The number of Designated Personnel carrying out seismic measurements at each Designated Seismic Station shall not exceed five. At least one individual fluent in the language of the Testing Party shall be among Designated Personnel at each Designated Seismic Station.

SECTION VII. ON-SITE INSPECTION

1. In carrying out on-site inspection, the Verifying Party shall have the right to confirm the validity of the geological, geophysical, and geometrical information provided in accordance with paragraphs 4 and 9 of Section IV of this Protocol, in accordance with the following procedures:

(a) the Testing Party shall provide Designated Personnel, upon their arrival at the test site, with the results of any studies of core samples and rock fragments extracted from each emplacement hole and any exploratory holes and tunnels, and the results of logging and geodetic measurements carried out in each emplacement hole and any exploratory holes and tunnels, relevant to the geology and geophysics of the emplacement medium, if the Testing Party carried out such studies and measurements;

(b) using their own equipment and under observation of personnel of the Testing Party, Designated Personnel shall have the right to carry out:

(i) if an emplacement hole is vertical, in the emplacement hole, from the end of the hole to the entrance to the hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, acoustic, television, and caliper logging, and measurements of the depth and cross section of the emplacement hole, as well as measurements to determine the location and volume of voids, using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding; and

(ii) if an emplacement hole is horizontal, in the holes specified in subparagraph (d)(ii) of this paragraph, and in the emplacement hole in the

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regions extending from each end of the emplacement hole to a point located 300 meters from the corresponding emplacement point in the direction of the entrance to the emplacement hole, gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, acoustic, and caliper logging, and measurements of the length and cross section of the emplacement hole, as well as measurements to determine the location and volume of voids, using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding;

(c) all logging and geometrical measurement data obtained by Designated Personnel in accordance with subparagraph (b) of this paragraph, including calibration data, shall be duplicated, and a copy of these data shall be provided to personnel of the Testing Party prior to the departure from the test site of Designated Personnel who have carried out those measurements. Calibration data shall include information needed to confirm the sensitivity of logging equipment under the conditions in which it is used;

(d) Designated Personnel shall have the right to receive:

(i) if an emplacement hole is vertical, core samples or rock fragments, at the option of Designated Personnel, extracted from the emplacement hole at 10 depths specified by Designated Personnel, plus one additional depth for every complete 50-meter distance between the uppermost and lowest emplacement points. The total volume of core samples or rock fragments extracted at each of the specified depths shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree; and

(ii) if an emplacement hole is horizontal, core samples or rock fragments, at the option of Designated Personnel, from the emplacement hole in the regions extending from each end of the emplacement hole to a point located 300 meters from the corresponding emplacement point in the direction of the entrance to the emplacement hole. Core samples shall be extracted during drilling from each of five holes drilled at stations in the emplacement hole, specified by

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Designated Personnel. These five stations shall be separated from each other by no less than 15 meters. At each station the hole shall be drilled in a direction specified by Designated Personnel, except that at each station within 65 meters of each emplacement point the Testing Party shall have the right to exclude two 90-degree sectors separated by a sector of 90 degrees. The diameter of each drilled hole shall be no less than 0.09 meters and no more than 0.15 meters, and the depth of each hole shall be no more than the diameter of the emplacement hole at that station. Core samples shall be extracted at locations specified by Designated Personnel along the drilled hole. Rock fragments shall be extracted from the walls of the emplacement hole at five stations specified by Designated Personnel. The total volume of core samples or rock fragments extracted at each station shall be no less than 400 cubic centimeters and no more than 3000 cubic centimeters, unless the Parties otherwise agree.

(e) core samples or rock fragments, at the option of Designated Personnel, shall be extracted, in accordance with subparagraph (d) of this paragraph, by personnel of the Testing Party, under observation of Designated Personnel, or by Designated Personnel, at the option of the Testing Party;

(f) if the Testing Party does not extract core samples or rock fragments in accordance with subparagraph (d) of this paragraph, Designated Personnel shall have the right to do so, using their own equipment and under observation of personnel of the Testing Party;

(g) if, prior to arrival of Designated Personnel at the test site, the Testing Party has cased more than a total of 20 meters within any 100-meter segment of a vertical emplacement hole in the region extending from the end of the emplacement hole to a point 300 meters from the planned emplacement point in the direction of the entrance to the emplacement hole, the Testing Party shall provide an uncased hole with respect to which the Verifying Party shall have the same rights as those specified for an emplacement hole in subparagraphs (b), (d), (e), and (f) of this paragraph. This uncased hole shall be located no more than 50 meters from the emplacement hole and shall have a depth no less than that of the emplacement hole. If personnel of the Testing Party, under observation of Designated Personnel, extract core samples through coring during

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the drilling of this uncased hole, the diameter of this hole shall be no less than 0.09 meters. If Designated Personnel, under observation of personnel of the Testing Party, extract core samples from this uncased hole following drilling, the diameter of this uncased hole shall be no less than 0.3 meters; and

(h) Designated Personnel shall have the right to retain core samples and rock fragments specified in subparagraphs (d), (e), (f), and (g) of this paragraph. Any such core samples or rock fragments shall be prepared in accordance with the procedures agreed upon by the Parties for shipment to the territory of the Verifying Party.

2. Designated Personnel shall have the right:

(a) if an emplacement hole is vertical, to observe the emplacement of each explosive canister into the emplacement hole from the time the bottom of the canister is last visible above the entrance of the emplacement hole, and to determine by direct measurement the depth of emplacement of the bottom of the canister;

(b) if an emplacement hole is horizontal, to determine by direct measurement the location of each explosive canister in the emplacement hole, and to confirm the presence of at least 10 meters of stemming, as specified in subparagraph (c)(ii) of this paragraph, in any previously stemmed tunnel that had provided access to an explosive canister, using, in a non-destructive way, such methods as electromagnetic measurements, radar, and acoustic sounding;

(c) to observe stemming of each emplacement hole:

(i) if an emplacement hole is vertical, until a solid concrete plug no less than three meters thick is installed above the explosive canister closest to the entrance to the emplacement hole; and

(ii) if an emplacement hole is horizontal, until access to any explosive canister has been prevented by installation of stemming material for a distance no less than 10 meters, including the installation of a solid concrete plug no less than three meters thick;

(d) to have access along agreed routes to the location of the test to carry out activities related to on-site inspection;

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(e) to have access to their equipment associated with the carrying out of on-site inspection from the time of its transfer to Designated Personnel at the test site, until it is transferred to personnel of the Testing Party in accordance with paragraph 9(g) of Section VIII of this Protocol, unless otherwise provided in this Protocol;

(f) if an emplacement hole is vertical, to have access, for the purpose of visual inspection of the ground surface, to the area delineated by a circle having a radius of 300 meters, centered on the entrance to the emplacement hole; and

(g) if an emplacement hole is horizontal, to have access, for the purpose of visual inspection of the ground surface, to the area delineated by a circle having a radius of 300 meters, centered directly above the emplacement point of each explosive canister.

3. Designated Personnel shall have the right to obtain photographs associated with on-site inspection, which shall be taken in accordance with paragraph 12 of Section V of this Protocol, of the following:

(a) if an emplacement hole is vertical, the emplacement of each explosive canister and the stemming of the emplacement hole specified in paragraph 2(c)(i) of this Section;

(b) if an emplacement hole is horizontal, the interior of the emplacement hole within 20 meters of the emplacement point of each explosive canister, and the stemming of the emplacement hole specified in paragraph 2(c)(ii) of this Section;

(c) core samples and rock fragments, extracted in accordance with paragraphs 1(d), 1(e), 1(f), and 1(g) of this Section, the equipment and activities associated with extracting such samples, as well as the interior of the emplacement hole, if the emplacement hole is horizontal, at the stations where core samples and rock fragments were extracted; and

(d) with the agreement of the Testing Party, other activities of Designated Personnel directly related to on-site inspection.

4. In no case shall the cumulative delay resulting from the photographic process specified in paragraph 3 of this Section exceed two hours for each of the operations specified in paragraph 3 of this Section, unless the Parties

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otherwise agree, except that stemming shall not be interrupted as a result of the photographic process.

5. All on-site inspection activities shall be carried out in accordance with the coordinated schedule. Designated Personnel shall have the right, within a period not to exceed 15 days, to carry out logging and coring activities specified in paragraph 1 of this Section, unless the Parties otherwise agree and so specify in the coordinated schedule. These activities shall be completed no less than one day prior to the beginning of emplacement of explosives. Upon completion of the activities specified in paragraph 1 of this Section, Designated Personnel shall depart the territory of the Testing Party, except that Designated Personnel who will also participate in the activities specified in paragraph 2 of this Section shall remain at the test site, if the Parties decide that this is required by the coordinated schedule. Otherwise, Designated Personnel shall depart the territory of the Testing Party or, if agreed by the Parties, they may depart to another point within the territory of the Testing Party. All Designated Personnel who will carry out the activities specified in paragraph 2 of this Section shall arrive at the test site in accordance with the coordinated schedule, but no less than three days prior to the date specified by the Testing Party for the beginning of these activities.

6. The number of Designated Personnel carrying out the activities specified in paragraph 1 of this Section shall not exceed 23 at any time. The number of Designated Personnel carrying out activities specified in paragraphs 2(a), 2(b), and 2(c) of this Section shall not exceed five at any time. At least one individual fluent in the language of the Testing Party shall be among Designated Personnel.

SECTION VIII. EQUIPMENT

1. Designated Personnel, in carrying out activities related to verification in accordance with this Protocol, shall have the right to bring into the territory of the Testing Party, install, and use:

(a) if the Verifying Party has provided notification of its intent to use the hydrodynamic yield measurement method, part or all of the equipment specified in paragraph 3 of this Section;

(b) if the Verifying Party has provided notification of its intent to use the seismic yield

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measurement method, part or all of the equipment specified in paragraph 4 of this Section;

(c) if the Verifying Party has provided notification of its intent to carry out on-site inspection, part or all of the equipment specified in paragraph 5 of this Section;

(d) maintenance and support equipment and spare parts necessary for the installation and functioning of equipment of the Verifying Party;

(e) electrical power supplies, converters, and associated cables;

(f) photographic equipment, if the Testing Party does not provide such equipment;

(g) locks, seals, and equipment necessary for installing seals of the Verifying Party and checking their integrity;

(h) medical and health physics equipment and supplies, personal protective gear, recreational items, and such other items as may be agreed upon by the Parties;

(i) office equipment and supplies, including, but not limited to, copying and facsimile machines, and personal computers;

(j) closed-circuit television equipment for the purpose of carrying out remote observation by Designated Personnel, in accordance with paragraph 9(g) of Section V of this Protocol, if the Testing Party does not provide such equipment; and

(k) satellite communications equipment, if the Testing Party does not provide satellite communications for Designated Personnel.

2. During the first meeting of the Coordinating Group for a specific test, the Parties shall agree, within 15 days, upon such additional materials, temporary structures, and equipment as may be requested in writing by the Verifying Party and which shall be supplied by the Testing Party for use by Designated Personnel. Such additional materials, temporary structures, and equipment, with their descriptions and operating instructions, shall be provided to Designated Personnel in accordance with the coordinated schedule.

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3. The list of equipment for the purposes of the use of the hydrodynamic yield measurement method in accordance with Section V of this Protocol shall include:

- (a) sensing elements and cables and transducers;
- (b) electrical cables for transmission of hydrodynamic data from the entrance of each horizontal satellite hole to the entrance of the horizontal emplacement hole with which it is associated;
- (c) the hydrodynamic recording facilities, with equipment, including computers, for acquiring, recording, and processing data and timing signals, as well as for transmitting and receiving hydrodynamic data and command and monitoring signals between each hydrodynamic recording facility and the command and monitoring facility, and the shock mitigation platforms for installing each hydrodynamic recording facility, and with equipment for distributing electrical analogs of the signals arriving from the instrumentation facility of the Testing Party;
- (d) trigger conditioner devices for generating a timing reference signal from the electrical cables of the Verifying Party, and terminal devices for converting an optical signal into an electrical signal;
- (e) the command and monitoring facility, with equipment, including computers, for generating and recording command and monitoring signals, for transmitting and receiving command and monitoring signals between each hydrodynamic recording facility and the command and monitoring facility, as well as for retrieving, storing, and processing hydrodynamic data;
- (f) electrical cables for transmission of hydrodynamic data from the entrance of each vertical satellite hole or from the entrance of each horizontal emplacement hole to the hydrodynamic recording facility of the Verifying Party;
- (g) electrical cables for the grounding of equipment and for above-ground transmission of electrical power, and electrical and fiber optic cables for above-ground transmission of command and monitoring signals and hydrodynamic data;
- (h) measuring and calibration instrumentation, support equipment, and equipment for installing and positioning sensing elements and cables and transducers;

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(i) equipment specified in paragraph 5 of this Section for confirming the characteristics of emplacement holes and satellite holes; and

(j) directional survey and magnetic survey equipment and equipment for determining the distance between emplacement holes and satellite holes, and equipment for detecting voids and determining their relative locations and volumes.

4. The list of equipment for the purposes of the use of the seismic yield measurement method at each Designated Seismic Station in accordance with Section VI of this Protocol shall include:

(a) seismic sensors capable of recording ground movements in three orthogonal directions within the frequency range from 0.1 to 10 hertz;

(b) equipment for amplifying, filtering, and digitizing the output signals of the seismic sensors;

(c) equipment for recording seismic data, and cables for interconnecting the equipment described in this paragraph;

(d) equipment for controlling sensors and recorders and for calibrating equipment;

(e) means of recording Universal Time Coordinated and referencing the recorded seismic data to it;

(f) equipment, including computers, to process data, to monitor the quality of the recorded data, as well as to display, store, and copy data; and

(g) equipment, including that using digital algorithms, for assessing the validity of recorded seismic data.

5. The list of equipment for the purposes of carrying out on-site inspection in accordance with Section VII of this Protocol shall include:

(a) equipment for obtaining the following logging data: gamma-gamma, gamma, neutron, electrical resistivity, magnetic susceptibility, gravity, television, acoustic, and caliper, as well as equipment for measuring the depth and cross section of emplacement holes and for measuring the volume of voids;

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(b) equipment, including computers, for calibrating logging equipment, for monitoring the quality of the recorded data, as well as for recording, displaying, and copying data from logging equipment;

(c) equipment for extracting core samples and rock fragments; and

(d) geologist's field tools and kits, and equipment for the recording of field data.

6. The Testing Party shall have the right, for the purposes of an initial familiarization, to inspect the equipment and every component thereof that the Verifying Party intends to use in carrying out activities related to verification, and thereafter shall have the right to familiarize itself with the equipment and every component thereof that had not previously been provided for this purpose in accordance with this paragraph. For these purposes:

(a) the equipment subject to familiarization by the Testing Party shall include:

(i) a set of equipment for hydrodynamic yield measurements, specified in paragraph 3 of this Section;

(ii) a set of equipment for seismic yield measurements, specified in paragraph 4 of this Section;

(iii) a set of equipment for on-site inspection, specified in paragraph 5 of this Section; and

(iv) the equipment specified in paragraphs 1(d), 1(e), 1(f), 1(g), 1(h), 1(i), 1(j), and 1(k) of this Section;

(b) the Verifying Party shall initiate the familiarization process by notifying the Testing Party no less than 30 days prior to the date on which it intends to deliver equipment to the point of entry. This notification shall include a preliminary inventory of the equipment and the planned date of its delivery;

(c) no less than seven days prior to the date of delivery of equipment, the Verifying Party shall provide a complete inventory of such equipment, which shall also specify which equipment, in accordance with paragraph 7(h) of this Section, will be removed from

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the facilities of the Verifying Party immediately prior to the beginning of the final dry run and immediately prior to the test. At the same time the Verifying Party shall provide instructions on the installation and operation of equipment with functional and technical descriptions and specifications, including electrical diagrams, as well as block diagrams of the system and its components;

(d) no more than 45 days following receipt of the equipment, the Testing Party, taking into account the equipment specified for removal in subparagraph (c) of this paragraph, shall specify, in writing, to the Verifying Party:

(i) the equipment approved by it for use by Designated Personnel in accordance with the information provided in accordance with subparagraph (c) of this paragraph; and

(ii) the characteristics of any equipment component it finds unacceptable because it is inconsistent with its non-intrusiveness, containment, safety, or security requirements;

(e) no more than 50 days following its initial delivery to the point of entry, equipment shall be returned, in the same condition as that in which it was received, to the Verifying Party at the point of entry; and

(f) following receipt of the written evaluation provided by the Testing Party in accordance with subparagraph (d)(ii) of this paragraph, the Verifying Party may deliver to the Testing Party, for familiarization in accordance with procedures specified in subparagraphs (b) and (c) of this paragraph, modified or replacement equipment to eliminate the unacceptable characteristics specified by the Testing Party, after which the procedures specified in subparagraphs (d) and (e) of this paragraph shall be followed with respect to the modified or replacement equipment.

7. The following procedures shall apply to equipment for use of the hydrodynamic yield measurement method:

(a) with the exception of that equipment that the Verifying Party intends to use from the equipment stored in accordance with subparagraph (j) of this paragraph, no less than 60 days prior to the planned date of the beginning of emplacement of sensing

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elements and cables or the planned date of the beginning of emplacement of explosives, whichever occurs earlier, unless the Parties otherwise agree, the Verifying Party shall deliver in sealed containers to the point of entry, at its option, either one or two sets of all or part of the equipment specified in paragraphs 1(d), 1(e), 1(f), 1(g), 1(h), 1(i), 1(k), 3(i), and 3(j) of this Section;

(b) with the exception of that equipment that the Verifying Party intends to use from the equipment stored in accordance with subparagraph (j) of this paragraph, no less than 45 days prior to the planned date of the beginning of emplacement of sensing elements and cables, unless the Parties otherwise agree, the Verifying Party shall deliver in sealed containers to the point of entry two identical sets of the equipment specified in paragraphs 3(a), 3(b), 3(c), 3(d), and 3(e) of this Section, and, at its option, either one or two sets of the equipment specified in paragraphs 1(j), 3(f), 3(g), and 3(h) of this Section, and, if it has not been delivered in accordance with subparagraph (a) of this paragraph, the equipment specified in paragraphs 1(d), 1(e), 1(f), 1(g), 1(h), 1(i), and 1(k) of this Section;

(c) these sets of equipment shall have the same components with the same functional and technical descriptions and specifications as the equipment approved by the Testing Party in accordance with paragraph 6(d)(i) of this Section;

(d) no less than seven days prior to the date of delivery of equipment to the point of entry, the Verifying Party shall provide a complete inventory of this equipment, specifying which equipment, in accordance with subparagraph (h) of this paragraph, will be removed from the facilities of the Verifying Party immediately prior to the beginning of the final dry run and immediately prior to the test;

(e) if the Verifying Party provides two identical sets of equipment:

(i) the Testing Party shall choose, at the point of entry, one of the two identical sets of each type of equipment for use by Designated Personnel, with the exception of the equipment specified in paragraphs 3(a) and 3(b) of this Section, and shall affix its own seals to the sealed containers in which that set of equipment arrived. The set of equipment not chosen by the

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Testing Party for use by Designated Personnel shall be subject to inspection by the Testing Party. Seals of the Verifying Party shall be removed from equipment chosen by the Testing Party for inspection, in the presence of personnel of both Parties, and thereafter this equipment shall be retained for inspection by the Testing Party without the presence of Designated Personnel for a period of no more than 30 days, after which time it shall be returned, in the same condition as that in which it was received, to the Verifying Party at the point of entry;

(ii) with respect to the equipment specified in paragraphs 3(a) and 3(b) of this Section, the Testing Party, under observation of Designated Personnel, shall remove the seals of the Verifying Party, combine the two sets of equipment, and randomly redistribute the items of each type of such equipment in order to produce two new identical sets. The Testing Party shall choose one of these new identical sets for use by Designated Personnel, and both Parties shall affix their own seals to the containers of that set. The set of equipment not chosen by the Testing Party for use by Designated Personnel shall be subject to inspection by the Testing Party in accordance with procedures specified in subparagraph (e)(iii) of this paragraph;

(iii) if the Verifying Party has delivered the equipment specified in paragraphs 3(a) and 3(b) of this Section with individual gas-blocking devices installed in the cables, Designated Personnel, under observation of personnel of the Testing Party, shall cut each cable at points three meters on either side of each gas-blocking device and shall place these gas-blocking devices and their attached cable segments in separate containers. If the Verifying Party delivered this equipment without individual gas-blocking devices installed, Designated Personnel, under observation of personnel of the Testing Party, shall cut a three-meter segment from each end of each cable and shall place these segments in separate containers. Personnel of each Party, under observation of personnel of the other Party, shall seal these separate containers of cable segments or gas-blocking devices with cable segments. The remainder of this equipment shall be retained for inspection by the Testing Party in accordance with subparagraph (e)(i) of this paragraph, except that

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during inspection of this equipment the Testing Party may remove up to 150 meters of cable from the set chosen for inspection, in no more segments than twice the number of cables in that set; the set of equipment not chosen by the Testing Party for use by Designated Personnel shall be subject to inspection by the Testing Party;

(iv) the Testing Party shall ensure protection of the equipment chosen by it for use by Designated Personnel and the sealed containers specified in subparagraph (e)(iii) of this paragraph while they are in its territory, and shall transport this equipment to the test site in such a manner as to ensure that it is delivered to Designated Personnel in the same condition as that in which it was received by the Testing Party. Prior to shipment to the test site, and from the time of its arrival at the test site until the time of its transfer to Designated Personnel, this equipment shall be kept sealed, in storage under conditions agreed upon by the Parties;

(v) personnel of the Testing Party shall consult with Designated Personnel regarding plans and schedule of shipment of the equipment no less than 48 hours prior to its shipment. Designated Personnel shall have the right to verify the integrity of their seals, to observe their equipment, and to accompany it from the point of entry to the test site. The equipment specified in subparagraph (a) of this paragraph shall be delivered to Designated Personnel for use at the test site no less than 25 days prior to the planned date of the beginning of emplacement of explosives or the planned date of the beginning of emplacement of sensing elements and cables, whichever occurs earlier, unless the Parties otherwise agree. The equipment specified in subparagraph (b) of this paragraph shall be delivered to Designated Personnel at the test site for use no less than 10 days prior to the planned date of the beginning of emplacement of sensing elements and cables, unless the Parties otherwise agree. Personnel of each Party shall remove their seals from the equipment under observation of personnel of the other Party. Prior to removing their seals, personnel of each Party shall have the right to verify the integrity of those seals, under observation of personnel of the other Party;

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(vi) seals affixed to the equipment specified in paragraphs 3(a), 3(b), and 3(d) of this Section shall not be removed prior to either the conduct of pressure tests and non-destructive inspections, in accordance with subparagraphs e(vii) and (e)(viii) of this paragraph, or preparation for installation of such equipment, at which time personnel of each Party shall remove their seals, under observation of personnel of the other Party. Prior to removing their seals, personnel of each Party shall have the right to verify the integrity of those seals, under observation of personnel of the other Party. Thereafter, personnel of the Testing Party shall have the right to observe all activities of Designated Personnel related to this equipment;

(vii) the Testing Party shall have the right to conduct pressure tests on the portions of cables with individual gas-blocking devices specified in subparagraph (e)(iii) of this paragraph, in accordance with its technical operations and practices and under observation of Designated Personnel, to ensure that the individual gas-blocking devices meet the containment requirements of the Testing Party. These pressure tests shall be conducted at a time specified by the Testing Party, at which time personnel of each Party shall verify the integrity of their seals on the containers specified in subparagraph (e)(iii) of this paragraph and shall remove their seals, under observation of personnel of the other Party. The Testing Party shall also have the right to conduct non-destructive inspections, under observation of Designated Personnel, on the set of cables chosen for use, to ensure that the cables chosen for use are identical in construction to those chosen for inspection. Such non-destructive inspections shall be carried out at a time specified by the Testing Party. All tests and non-destructive inspections related to the containment requirements of the Testing Party shall be completed, and the results communicated to the Designated Personnel Team Leader at the test site, no less than 10 days prior to the planned date for the beginning of emplacement of sensing elements and cables. If all of the individual gas-blocking devices removed from cables in the set chosen for inspection, in accordance with subparagraph (e)(iii) of this paragraph, successfully meet the containment requirements, and if cables chosen for

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use are found to be identical in construction to those chosen for inspection, then the set chosen for use shall be sealed by the seals of both Parties, which shall not be removed prior to preparation for installation of such equipment. Following the pressure tests, the Testing Party shall have the right to retain the individual gas-blocking devices with their attached cable segments from the set chosen for inspection;

(viii) if the Verifying Party delivered the equipment specified in paragraphs 3(a) and 3(b) of this Section without individual gas-blocking devices installed in the cables, the Testing Party shall have the right to conduct pressure tests, in accordance with its technical operations and practices, to ensure that the gas-blocking properties of these cables meet the containment requirements of the Testing Party. These tests shall be performed under observation of Designated Personnel on the segments of cables specified in subparagraph (e)(iii) of this paragraph as well as on a three-meter segment of each cable of the set chosen for use, removed by Designated Personnel, under observation of personnel of the Testing Party, from the end of the cable that will extend to the ground surface. These pressure tests shall be conducted at a time specified by the Testing Party, at which time personnel of each Party shall verify the integrity of their seals on the containers specified in subparagraph (e)(iii) of this paragraph, as well as on the containers with the set of equipment chosen for use, specified in paragraphs 3(a) and 3(b), and shall remove their seals under observation of personnel of the other Party. All tests related to the containment requirements of the Testing Party shall be completed, and the results communicated to the Designated Personnel Team Leader at the test site, no less than 10 days prior to the planned date for the beginning of emplacement of sensing elements and cables. If all of the cable segments removed from the set chosen for use and the set chosen for inspection meet the containment requirements of the Testing Party, then the set chosen for use shall be sealed by the seals of both Parties, which shall not be removed prior to preparation for installation of such equipment and its use in hydrodynamic yield measurements; and

(ix) if, within one day following the completion of testing and non-destructive

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inspections specified in subparagraphs (e)(vii) and (e)(viii) of this paragraph, the Verifying Party so requests, the Testing Party shall provide cables that meet its containment requirements. The Testing Party shall deliver these cables to Designated Personnel at the test site no more than two days following the request of the Verifying Party but no less than seven days prior to the planned date for the beginning of emplacement of sensing elements and cables, unless the Parties otherwise agree;

(f) if the Verifying Party provides only one set of equipment:

(i) upon arrival of the equipment at the point of entry, the seals of the Verifying Party shall be removed from this equipment in the presence of personnel of both Parties, after which the Testing Party shall have the right to inspect this equipment for no more than 30 days, without the presence of Designated Personnel;

(ii) upon completion of the inspection, the Testing Party shall transport all approved equipment to the test site and deliver it, in the same condition as that in which it was received, to Designated Personnel. The equipment specified in subparagraph (a) of this paragraph shall be delivered to Designated Personnel no less than 25 days prior to the planned date of the beginning of emplacement of explosives or the planned date of the beginning of emplacement of sensing elements and cables, whichever occurs earlier, unless the Parties otherwise agree. The equipment specified in subparagraph (b) of this paragraph shall be delivered to Designated Personnel at the test site no less than 10 days prior to the planned date of the beginning of emplacement of sensing elements and cables, unless the Parties otherwise agree; and

(iii) within five days following delivery of equipment to Designated Personnel, the Designated Personnel Team Leader shall certify, in writing, to the Representative of the Testing Party that the equipment delivered to the test site is in working condition or, in the event of damage to the equipment, shall report such damage in writing;

(g) upon completion of inspection of the equipment, in accordance with subparagraphs (e)(i) and (f)(i) of this paragraph, the Testing Party shall

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inform the Verifying Party, in writing, of any equipment that does not conform to that approved previously in accordance with paragraph 6(d)(i) of this Section and shall specify the non-conforming characteristics of any such equipment or component thereof. Prior to shipment to the test site, in the case of equipment provided in one set, or at the time of delivery to Designated Personnel at the test site of the set of equipment chosen for use, in the case of equipment provided in two sets, the equipment that does not conform to that approved previously shall be removed by Designated Personnel under observation of personnel of the Testing Party and placed under seals of both Parties in storage at a location chosen by the Testing Party. Any such equipment shall be returned by the Testing Party to Designated Personnel at the point of entry following completion of the activity related to verification for which it was originally provided. Except as otherwise provided in this Protocol, equipment approved by the Testing Party shall remain under the exclusive control of Designated Personnel from the time of its delivery to Designated Personnel at the test site until it is transferred to the Testing Party in accordance with subparagraph (i) of this paragraph;

(h) immediately prior to the beginning of the final dry run, Designated Personnel, under observation of personnel of the Testing Party, shall remove from each hydrodynamic recording facility and the command and monitoring facility all items specified in accordance with paragraph 6(c) of this Section for removal at that time. These items shall be placed under the seals of both Parties and stored at a location chosen by the Testing Party. Upon departure of personnel of both Parties from each hydrodynamic recording facility immediately prior to the test, all remaining maintenance and support equipment and spare parts shall be removed by Designated Personnel, unless the Parties otherwise agree;

(i) personnel of the Testing Party shall have the right to inspect equipment after it has been used for carrying out activities related to hydrodynamic yield measurements, for a period of 30 days, without the presence of Designated Personnel. For these purposes:

(i) the equipment used for carrying out activities specified in paragraphs 4(g), 5(c), and 5(f) or 5(g) or 5(h), and 6(b), 6(f), 7(c), and 7(f) or 7(g) or 7(h) of Section V of this Protocol shall be transferred to the Testing Party upon

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completion of all these activities, unless the Parties agree that equipment for any specific activity may be transferred upon completion of that activity;

(ii) all other equipment, except that specified in paragraphs 1(e), 1(g), 1(h), 1(i), and 1(k) of this Section, shall be transferred to the Testing Party upon completion of all activities specified in paragraphs 9(m) and 14(b) of Section V of this Protocol;

(iii) equipment specified in paragraphs 1(e), 1(g), 1(h), 1(i), and 1(k) of this Section shall be transferred to the Testing Party upon completion of all activities of Designated Personnel specified in Section V of this Protocol; and

(iv) during inspection of equipment specified in paragraphs 3(f) and 3(g) of this Section, after it has been used for carrying out activities related to hydrodynamic yield measurements, the Testing Party shall have the right to remove and retain no more than 150 meters of those cables, in no more segments than twice the number of cables in each set, with the exception of the fiber optic cables and the electrical cables for above-ground transmission of electrical power;

(j) the Verifying Party shall have the right to store for subsequent use part or all of its equipment in the territory of the Testing Party. Storage shall be under conditions agreed upon by the Parties, at a location chosen by the Testing Party and under its protection;

(k) with respect to inventory and shipment or storage of this equipment, the following procedures, at the option of the Verifying Party, shall be applied:

(i) upon transfer of equipment to the Testing Party for inspection, in accordance with subparagraph (i) of this paragraph, Designated Personnel shall provide complete inventories of equipment to be stored and equipment to be shipped to their territory. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within five days following completion of inspection of equipment to be shipped, the Testing

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Party shall return this equipment to Designated Personnel at the point of entry, in the same condition as that in which it was received. Elimination of information stored in memories shall not be deemed damage to the equipment; or

(ii) within five days following completion of inspection of equipment in accordance with subparagraph (i) of this paragraph, the Testing Party shall return this equipment to Designated Personnel at a location chosen by the Testing Party, in the same condition as that in which it was received. Elimination of information stored in memories shall not be deemed damage to the equipment. Designated Personnel shall examine, inventory, and pack their equipment in containers. Personnel of the Testing Party shall have the right to observe these activities. Within five days following receipt of their equipment, Designated Personnel shall transfer to the Testing Party the packed containers, along with inventories of the equipment to be stored and the equipment to be shipped. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within 10 days following receipt of the equipment to be shipped, the Testing Party shall deliver it to the point of entry; and

(1) if stored equipment is to be used for activities related to verification of a subsequent test, it shall be subject to further inspection only after such use. The equipment specified in subparagraph (a) of this paragraph shall be delivered, in the same condition as that in which it was received, to Designated Personnel for use at the test site no less than 25 days prior to the planned date of the beginning of emplacement of explosives or the planned date of the beginning of emplacement of sensing elements and cables, whichever occurs earlier, unless the Parties otherwise agree. The equipment specified in subparagraph (b) of this paragraph shall be delivered, in the same condition as that in which it was received, to Designated Personnel at the test site no later than 10 days prior to the planned date of the beginning of emplacement of sensing elements and cables, unless the Parties otherwise agree.

8. The following procedures shall apply to equipment for use of the seismic yield measurement method:

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(a) with the exception of that equipment that the Verifying Party intends to use from the equipment stored in accordance with subparagraph (h) of this paragraph, no less than 45 days prior to the planned date of the test, unless the Parties otherwise agree, the Verifying Party shall deliver in sealed containers to the point of entry, at its option, either one or two sets of all or part of the equipment specified in paragraphs 1(d), 1(e), 1(f), 1(g), 1(h), 1(i), and 4 of this Section;

(b) these sets of equipment shall have the same components with the same functional and technical descriptions and specifications as the equipment approved by the Testing Party in accordance with paragraph 6(d)(1) of this Section;

(c) no less than seven days prior to the date of delivery of equipment to the point of entry, the Verifying Party shall provide a complete inventory of this equipment;

(d) if the Verifying Party provides two identical sets of equipment:

(i) the Testing Party shall choose, at the point of entry, one of the two identical sets of each type of equipment for use by Designated Personnel, and shall affix its own seals to the sealed containers in which that set of equipment arrived;

(ii) the Testing Party shall ensure protection of this equipment while it is in its territory, and shall transport this equipment to the Designated Seismic Stations in such a manner as to ensure that it is delivered to Designated Personnel in the same condition as that in which it was received by the Testing Party. Prior to shipment to the Designated Seismic Stations, and from the time of its arrival at the Designated Seismic Stations until the time of its transfer to Designated Personnel, the set of equipment chosen by the Testing Party for use by Designated Personnel shall be kept sealed, in storage under conditions agreed upon by the Parties;

(iii) personnel of the Testing Party shall consult with Designated Personnel regarding plans and schedule of shipment of the equipment no less than 48 hours prior to its shipment. Designated Personnel shall have the right to verify the

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integrity of their seals, to observe their equipment, and to accompany it from the point of entry to the Designated Seismic Stations. This equipment shall be delivered to Designated Personnel at Designated Seismic Stations for installation and use no less than 10 days prior to the planned date of the test. Personnel of each Party shall remove their seals from the equipment under observation of personnel of the other Party. Prior to removing their seals, personnel of each Party shall have the right to verify the integrity of those seals, under observation of personnel of the other Party; and

(iv) seals of the Verifying Party shall be removed from equipment chosen by the Testing Party for inspection, in the presence of personnel of both Parties, and thereafter this equipment shall be retained for inspection by the Testing Party without the presence of Designated Personnel for a period of no more than 30 days, after which time it shall be returned, in the same condition as that in which it was received, to the Verifying Party at the point of entry;

(e) if the Verifying Party provides only one set of equipment:

(i) upon arrival of the equipment at the point of entry, the seals of the Verifying Party shall be removed from this equipment in the presence of personnel of both Parties, after which the Testing Party shall have the right to inspect this equipment for no more than 30 days, without the presence of Designated Personnel;

(ii) upon completion of the inspection, the Testing Party shall transport all approved equipment to the Designated Seismic Stations and deliver it, in the same condition as that in which it was received, to Designated Personnel no less than 10 days prior to the planned date of the test, unless the Parties otherwise agree; and

(iii) within three days following delivery of the equipment to Designated Personnel, the Designated Personnel Team Leader shall certify in writing to the Representative of the Testing Party that the equipment delivered to the Designated Seismic Station is in working condition or, in the event of damage to the equipment, shall report such damage in writing;

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(f) upon completion of inspection of the equipment, in accordance with subparagraphs (d)(iv) and (e)(i) of this paragraph, the Testing Party shall inform the Verifying Party, in writing, of any equipment that does not conform to that approved previously in accordance with paragraph 6(d)(i) of this Section and shall specify the non-conforming characteristics of any such equipment or component thereof. Prior to shipment to the Designated Seismic Station, in the case of equipment provided in one set, or at the time of delivery to Designated Personnel at the Designated Seismic Station of the set of equipment chosen for use, in the case of equipment provided in two sets, the equipment that does not conform to that approved previously shall be removed by Designated Personnel under observation of personnel of the Testing Party and placed under seals of both Parties in storage at a location chosen by the Testing Party. Any such equipment shall be returned by the Testing Party to Designated Personnel at the point of entry following completion of the activity related to verification for which it was originally provided. Except as otherwise provided in this Protocol, equipment approved by the Testing Party shall remain under the exclusive control of Designated Personnel from the time of its delivery to Designated Personnel at a Designated Seismic Station until it is transferred to the Testing Party in accordance with subparagraphs (g) and (j) of this paragraph;

(g) personnel of the Testing Party shall have the right to inspect equipment after it has been used for activities related to seismic yield measurements for a period of 30 days, without the presence of Designated Personnel. If the Testing Party decides to inspect that equipment, it shall be transferred to the Testing Party upon completion of activities specified in Section VI of this Protocol;

(h) the Verifying Party shall have the right to store for subsequent use part or all of its equipment in the territory of the Testing Party. Storage shall be under conditions agreed upon by the Parties, at a location chosen by the Testing Party and under its protection;

(i) if the Testing Party inspects the equipment, with respect to inventory and shipment or storage of this equipment, the following procedures, at the option of the Verifying Party, shall be applied:

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(i) upon transfer of equipment to the Testing Party for inspection in accordance with subparagraph (g) of this paragraph, Designated Personnel shall provide complete inventories of equipment to be stored and equipment to be shipped to their territory. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within five days following completion of inspection of equipment to be shipped, the Testing Party shall return this equipment to Designated Personnel at the point of entry, in the same condition as that in which it was received. Elimination of information stored in memories shall not be deemed damage to the equipment; or

(ii) within five days following completion of inspection of equipment in accordance with subparagraph (g) of this paragraph, the Testing Party shall return this equipment to Designated Personnel at a location chosen by the Testing Party in the same condition as that in which it was received. Elimination of information stored in memories shall not be deemed damage to the equipment. Designated Personnel shall examine, inventory, and pack their equipment in containers. Personnel of the Testing Party shall have the right to observe these activities. Within five days following receipt of their equipment, Designated Personnel shall transfer to the Testing Party the packed containers, along with inventories of the equipment to be stored and the equipment to be shipped. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within 10 days following receipt of equipment to be shipped, the Testing Party shall deliver it to the point of entry;

(j) if the Testing Party chooses not to inspect the equipment upon completion of activities related to seismic yield measurements, Designated Personnel shall prepare the equipment for storage or shipment to their territory prior to departure from the Designated Seismic Station and, upon transfer of equipment to the Testing Party, shall provide complete inventories of equipment to be stored and equipment to be shipped. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the

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inventories. Equipment to be shipped shall be returned to the Verifying Party at the point of entry within 10 days following departure of Designated Personnel from the Designated Seismic Station. Equipment to be stored shall be prepared for storage, in accordance with agreed procedures for the conditions of storage chosen by the Testing Party; and

(k) if stored equipment is to be used for activities related to verification of a subsequent test, it shall be subject to further inspection only after such use. This equipment shall be delivered, in the same condition as that in which it was received, to Designated Personnel for use at the Designated Seismic Stations no later than 10 days prior to the planned date of the test, unless the Parties otherwise agree.

9. The following procedures shall apply to equipment for carrying out on-site inspection:

(a) with the exception of that equipment that the Verifying Party intends to use from the equipment stored in accordance with subparagraph (h) of this paragraph, no less than 55 days prior to the planned date of the beginning of emplacement of explosives, unless the Parties otherwise agree, the Verifying Party shall deliver in sealed containers to the point of entry, at its option, either one or two sets of all or part of the equipment specified in paragraphs 1(d), 1(e), 1(f), 1(g), 1(h), 1(i), 1(k), and 5 of this Section;

(b) these sets of equipment shall have the same components with the same functional and technical descriptions and specifications as the equipment approved by the Testing Party in accordance with paragraph 6(d)(i) of this Section;

(c) no less than seven days prior to the date of delivery of equipment to the point of entry, the Verifying Party shall provide a complete inventory of this equipment;

(d) if the Verifying Party provides two identical sets of equipment:

(i) the Testing Party shall choose, at the point of entry, one of the two identical sets of each type of equipment for use by Designated Personnel, and shall affix its own seals to the sealed containers in which that set of equipment arrived;

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(ii) the Testing Party shall ensure protection of this equipment while it is in its territory, and shall transport this equipment to the test site in such a manner as to ensure that it is delivered to Designated Personnel in the same condition as that in which it was received by the Testing Party. Prior to shipment to the test site, and from the time of its arrival at the test site until the time of its transfer to Designated Personnel, the set of equipment chosen by the Testing Party for use by Designated Personnel shall be kept sealed, in storage under conditions agreed upon by the Parties;

(iii) personnel of the Testing Party shall consult with Designated Personnel regarding plans and schedule of shipment of the equipment no less than 48 hours prior to its shipment. Designated Personnel shall have the right to verify the integrity of their seals, to observe their equipment, and to accompany it from the point of entry to the test site. This equipment shall be delivered to Designated Personnel at the test site no less than 20 days before the planned date of the beginning of emplacement of explosives, unless the Parties otherwise agree. Personnel of each Party shall remove their seals from the equipment under observation of personnel of the other Party. Prior to removing their seals, personnel of each Party shall have the right to verify the integrity of those seals, under observation of personnel of the other Party; and

(iv) seals of the Verifying Party shall be removed from equipment chosen by the Testing Party for inspection, in the presence of personnel of both Parties, and thereafter this equipment shall be retained for inspection by the Testing Party without the presence of Designated Personnel for a period of no more than 30 days, after which time it shall be returned, in the same condition as that in which it was received, to the Verifying Party at the point of entry;

(e) if the Verifying Party provides only one set of equipment:

(i) upon arrival of the equipment at the point of entry, the seals of the Verifying Party shall be removed from this equipment in the presence of personnel of both Parties, after which the Testing Party shall have the right to inspect

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this equipment for no more than 30 days, without the presence of Designated Personnel;

(ii) upon completion of the inspection, the Testing Party shall transport all approved equipment to the test site and deliver it, in the same condition as that in which it was received, to Designated Personnel no less than 20 days prior to the planned date of the beginning of emplacement of explosives, unless the Parties otherwise agree; and

(iii) within five days following delivery of equipment to Designated Personnel, the Designated Personnel Team Leader shall certify, in writing, to the Representative of the Testing Party that the equipment delivered to the test site is in working condition or, in the event of damage to the equipment, shall report such damage in writing;

(f) upon completion of inspection of the equipment in accordance with subparagraphs (d)(iv) and (e)(i) of this paragraph, the Testing Party shall inform the Verifying Party, in writing, of any equipment that does not conform to that approved previously in accordance with paragraph 6(d)(i) of this Section and shall specify the non-conforming characteristics of any such equipment or component thereof. Prior to shipment to the test site, in the case of equipment provided in one set, or at the time of delivery to Designated Personnel at the test site of the set of equipment chosen for use, in the case of equipment provided in two sets, the equipment that does not conform to that approved previously shall be removed by Designated Personnel under observation of personnel of the Testing Party and placed under seals of both Parties in storage at a location chosen by the Testing Party. Any such equipment shall be returned by the Testing Party to Designated Personnel at the point of entry, following completion of the activity related to verification for which it was originally provided. Except as otherwise provided in this Protocol, equipment approved by the Testing Party shall remain under the exclusive control of Designated Personnel from the time of its delivery to Designated Personnel at the test site until it is transferred to the Testing Party in accordance with subparagraph (g) of this paragraph;

(g) personnel of the Testing Party shall have the right to inspect equipment after it has been used for carrying out activities related to on-site inspection,

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for a period of 30 days, without the presence of Designated Personnel. For these purposes:

(i) the equipment used for carrying out activities specified in paragraphs 1(b), 1(c), 1(e), 1(f), 1(g), and 1(h) of Section VII of this Protocol shall be transferred to the Testing Party upon completion of all these activities, unless the Parties agree that equipment for any specific activity may be transferred upon completion of that activity; and

(ii) all other equipment shall be transferred to the Testing Party upon completion of all activities of Designated Personnel specified in Section VII of this Protocol;

(h) the Verifying Party shall have the right to store for subsequent use part or all of its equipment in the territory of the Testing Party. Storage shall be under conditions agreed by the Parties, at a location chosen by the Testing Party and under its protection;

(i) with respect to inventory and shipment or storage of this equipment, the following procedures, at the option of the Verifying Party, shall be applied:

(i) upon transfer of equipment to the Testing Party for inspection in accordance with subparagraph (g) of this paragraph, Designated Personnel shall provide complete inventories of equipment to be stored and equipment to be shipped to their territory. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within five days following completion of inspection of the equipment to be shipped, the Testing Party shall return this equipment to Designated Personnel at the point of entry, in the same condition as that in which it was received. Elimination of information stored in memories shall not be deemed damage to the equipment; or

(ii) within five days following completion of inspection of equipment in accordance with subparagraph (g) of this paragraph, the Testing Party shall return this equipment to Designated Personnel at a location chosen by the Testing Party, in the same condition as that in which it was received. Elimination of information stored

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in memories shall not be deemed damage to the equipment. Designated Personnel shall examine, inventory, and pack their equipment in containers. Personnel of the Testing Party shall have the right to observe these activities. Within five days following receipt of their equipment, Designated Personnel shall transfer to the Testing Party the packed containers, along with inventories of the equipment to be stored and the equipment to be shipped. These inventories shall be signed by the Designated Personnel Team Leader and the Representative of the Testing Party, each of whom shall retain a copy of the inventories. Within 10 days following receipt of the equipment to be shipped, the Testing Party shall deliver it to the point of entry; and

(j) if stored equipment is to be used for activities related to verification of a subsequent test, it shall be subject to further inspection only after such use. This equipment shall be delivered, in the same condition as that in which it was received, to Designated Personnel at the test site no less than 20 days prior to the planned date of the beginning of emplacement of explosives for that test, unless the Parties otherwise agree.

SECTION IX. DESIGNATED PERSONNEL AND TRANSPORT PERSONNEL

1. No later than 10 days following entry into force of the Treaty each Party shall provide the other Party with a list of its proposed Designated Personnel who will carry out activities in accordance with this Protocol and a list of its proposed Transport Personnel who will provide transportation for these Designated Personnel, their baggage, and equipment of the Verifying Party. These lists shall contain name, date of birth, and sex of each individual of its proposed Designated Personnel and Transport Personnel. The list of Designated Personnel shall at no time include more than 300 individuals, and the list of Transport Personnel shall at no time include more than 200 individuals.

2. Each Party shall review the list of Designated Personnel and the list of Transport Personnel proposed by the other Party. If the Party reviewing a list determines that an individual included thereon is acceptable to it, it shall so inform the Party providing the list within 20 days

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following receipt of the list, and such an individual shall be deemed accepted. If the Party reviewing a list determines that an individual included thereon is not acceptable to it, it shall so inform the Party providing the list of its objection within 20 days following receipt of the list, and such an individual shall be deemed unaccepted and shall be deleted from the list.

3. Each Party may propose the addition or substitution of individuals on its list of Designated Personnel or its list of Transport Personnel at any time, who shall be designated in the same manner as provided in paragraph 2 of this Section with regard to the initial lists. Annually, no more than 100 individuals from the list of Designated Personnel shall be subject to substitution. This limitation shall not apply to the replacement of individuals due to permanent physical incapacity or death, or to deletion of an individual from the list of Designated Personnel in accordance with paragraph 5 of this Section. Replacement of an individual due to permanent physical incapacity, death or deletion from the list shall be accomplished in the same manner as provided in paragraph 2 of this Section.

4. Following receipt of the initial list of Designated Personnel or the initial list of Transport Personnel or of subsequent changes thereto, the Party receiving such information shall prepare for the issuance of such visas and other documents as may be required to ensure that each individual on the list of Designated Personnel or the list of Transport Personnel who has been accepted may enter and remain in its territory for the purpose of carrying out activities in accordance with this Protocol. Such visas and documents shall be provided by the Testing Party only to the individuals whose names are included in the notification provided by the Verifying Party, in accordance with paragraphs 2 and 3 of Section X of this Protocol, upon receipt of such notification. Such visas and documents shall be valid for multiple entry throughout the period required for Designated Personnel to carry out their activities related to verification of a specific test.

5. If a Party determines that an individual included on the list of Designated Personnel or the list of Transport Personnel of the other Party has violated the provisions of this Protocol or has ever committed a criminal offense in its territory, or has ever been sentenced for committing a criminal offense, or has ever been expelled from its territory, the Party making such a determination shall notify the other Party of its objection to the continued inclusion of this individual on the list. If at that time this individual is present in the territory of the Party raising the objection, then the other Party shall

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immediately recall this individual from the territory of the Party raising this objection and immediately thereafter delete that individual from the list of Designated Personnel or from the list of Transport Personnel.

6. Designated Personnel with their personal baggage and equipment of the Verifying Party shall be permitted to enter the territory of the Testing Party at the designated point of entry, to remain in that territory, and to exit that territory through the designated point of entry.

7. Designated Personnel and Transport Personnel shall be accorded the following privileges and immunities for the entire period they are in the territory of the Testing Party and thereafter with respect to acts previously performed in the exercise of their official functions as Designated Personnel or Transport Personnel:

(a) Designated Personnel and Transport Personnel shall be accorded the inviolability enjoyed by diplomatic agents pursuant to Article 29 of the Vienna Convention on Diplomatic Relations of April 18, 1961;

(b) living and working quarters occupied by Designated Personnel and Transport Personnel carrying out activities in accordance with this Protocol shall be accorded the inviolability and protection accorded the quarters of missions and diplomatic agents pursuant to Articles 22 and 30 of the Vienna Convention on Diplomatic Relations;

(c) archives, documents, papers, and correspondence of Designated Personnel and Transport Personnel shall enjoy the inviolability accorded the archives, documents, papers, and correspondence of missions and diplomatic agents pursuant to Articles 24 and 30 of the Vienna Convention on Diplomatic Relations. In addition, the aircraft or other transport vehicles of the Verifying Party shall be inviolable;

(d) Designated Personnel and Transport Personnel shall be accorded the immunities accorded diplomatic agents pursuant to paragraphs 1, 2, and 3 of Article 31 of the Vienna Convention on Diplomatic Relations. Immunity from jurisdiction of Designated Personnel or Transport Personnel may be waived by the Verifying Party in those cases in which it is of the opinion that immunity would impede the course of justice, and it can be waived without prejudice to the implementation of the provisions of this Protocol. Waiver must always be express;

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(e) Designated Personnel and Transport Personnel carrying out their activities in accordance with this Protocol shall be accorded the exemption from dues and taxes accorded diplomatic agents pursuant to Article 34 of the Vienna Convention on Diplomatic Relations;

(f) living and working quarters occupied by Designated Personnel and Transport Personnel carrying out their activities in accordance with this Protocol shall be accorded the exemption from dues and taxes accorded mission premises pursuant to Article 23 of the Vienna Convention on Diplomatic Relations; and

(g) Designated Personnel and Transport Personnel shall be permitted to bring into the territory of the Testing Party, without payment of any customs duties or related charges, articles for their personal use, with the exception of articles the import or export of which is prohibited by law or controlled by quarantine regulations.

8. Designated Personnel and Transport Personnel shall not engage in any professional or commercial activity for personal profit in the territory of the Testing Party.

9. Without prejudice to their privileges and immunities, Designated Personnel and Transport Personnel shall be obliged to respect the laws and regulations of the Testing Party and shall be obliged not to interfere in the internal affairs of that Party.

10. If the Testing Party considers that there has been an abuse of privileges and immunities specified in paragraph 7 of this Section, consultations shall be held between the Parties to determine whether such an abuse has occurred and, if so determined, to prevent a repetition of such an abuse.

SECTION X. ENTRY, TRANSPORT, FOOD, LODGING, AND
PROVISION OF SERVICES FOR DESIGNATED PERSONNEL
AND TRANSPORT PERSONNEL

1. The Testing Party shall ensure Designated Personnel and Transport Personnel access to its territory for the purposes of carrying out activities related to verification in accordance with this Protocol, and shall provide these personnel with such other assistance as may be necessary to enable them to carry out these activities. Designated Personnel shall have the right to be present at the test

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site and at Designated Seismic Stations in the territory of the Testing Party to carry out activities related to verification in accordance with this Protocol at such times and for such periods as required to carry out these activities. The specific times and periods for carrying out such activities shall be specified in the coordinated schedule.

2. No less than 20 days prior to the planned date of arrival of its Designated Personnel at the point of entry for participation in activities related to verification of a specific test, the Verifying Party shall provide the Testing Party with:

(a) a list of the names of the Designated Personnel with their passports and documentation, who will carry out activities related to verification of a specific test;

(b) the names of the Designated Personnel Team Leader or Leaders and the names of Designated Personnel who will escort equipment of the Verifying Party to the test site or each Designated Seismic Station;

(c) confirmation of the point of entry to be used;

(d) the planned date and the estimated time of arrival of these Designated Personnel at the point of entry; and

(e) the mode of transport to be used.

No more than 15 days following receipt of the list and passports and documentation specified in subparagraph (a) of this paragraph, the Testing Party shall return those passports to the Verifying Party with the visas and all necessary documents specified in paragraph 4 of Section IX of this Protocol.

3. No less than 20 days prior to the planned date of arrival of Transport Personnel at the point of entry, the Verifying Party shall provide the Testing Party with the number of Transport Personnel. No less than three days prior to the planned date of arrival of Transport Personnel, the Verifying Party shall provide the Testing Party with a list of the names of those Transport Personnel with their passports and documentation. No less than one day prior to the planned date of arrival of Transport Personnel, the Testing Party shall return those passports to the Verifying Party with the visas and all necessary documents specified in paragraph 4 of Section IX of this Protocol.

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4. The number of Designated Personnel present at a test site or Designated Seismic Station to carry out activities related to verification of a specific test shall be governed by the relevant restrictions specified in Sections V, VI, and VII of this Protocol. Designated Personnel shall leave the test site or Designated Seismic Station upon completion of activities related to verification of a specific test as specified in the coordinated schedule. Designated Personnel who have been present at the test site for a period of six consecutive weeks or more may be replaced by individuals included on the list submitted in accordance with paragraph 1 of Section IX of this Protocol. Designated Personnel who have not been present at the test site for a period of six consecutive weeks may be replaced only for reasons of injury, illness, or family emergency, and shall be replaced by individuals included on the list submitted in accordance with paragraph 1 of Section IX of this Protocol.

5. If a transport aircraft other than a regularly scheduled commercial aircraft is used by the Verifying Party for transportation between the territory of the Verifying Party and the point of entry, its flight path shall be along airways agreed upon by the Parties, and its flight plan shall be filed in accordance with the procedures of the International Civil Aviation Organization applicable to civil aircraft, including in the remarks section of the flight plan a confirmation that the appropriate clearance has been obtained. The Testing Party shall provide parking, security protection, servicing, and fuel for aircraft of the Verifying Party at the point of entry. The Verifying Party shall bear the cost of such fuel and servicing.

6. The Testing Party shall ensure that all necessary clearances or approvals are granted so as to enable Designated Personnel, their baggage, and equipment of the Verifying Party to arrive at the point of entry by the estimated arrival date and time.

7. The Testing Party shall assist Designated Personnel and Transport Personnel and their baggage in passage through customs without undue delay. The Testing Party shall provide transportation between the point of entry and the test site or the Designated Seismic Stations for Designated Personnel, their baggage, and equipment of the Verifying Party, so as to enable such personnel to exercise their rights and functions in the time periods provided in this Protocol and specified in the coordinated schedule.

8. The Testing Party shall have the right to assign its personnel to escort Designated Personnel and Transport Personnel while they are in its territory.

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9. Except as otherwise provided in this Protocol, movement and travel of Designated Personnel and Transport Personnel in the territory of the Testing Party, from the time of their arrival at the point of entry until their departure from the territory of the Testing Party at the point of entry, shall be subject to the authorization of the Testing Party.

10. During the period Designated Personnel and Transport Personnel are in the territory of the Testing Party, the Testing Party shall provide food, hotel-like living accommodations, working facilities, transportation, and medical services for such personnel, including access to its medical facilities for out-patient treatment and in-patient treatment, and also secure places for storing equipment. If the Verifying Party desires to provide its own food for its Designated Personnel and its Transport Personnel during their stay in the territory of the Testing Party, the Testing Party shall provide such assistance as may be necessary for such food to arrive at the appropriate locations. Designated Personnel shall have the use of a complete kitchen at all times during their stay at the test site and at each Designated Seismic Station.

11. The Verifying Party shall have the right to include among its Designated Personnel a medical specialist, who shall be allowed to bring medications, medical instruments, and portable medical equipment agreed upon by the Parties. If Designated Personnel are treated in a medical facility of the Testing Party, the medical specialist shall have the right to consult on the recommended treatment and monitor the course of medical treatment at all times. The medical specialist of the Verifying Party shall have the right to require the Testing Party to provide emergency evacuation of any individual of the Designated Personnel who is ill or has suffered an accident to a mutually agreed medical facility in the territory of the Testing Party or to the point of entry for emergency medical evacuation by the Verifying Party. Designated Personnel shall have the right to refuse any treatment prescribed by medical personnel of the Testing Party, and in this case the Testing Party shall not be responsible for any consequences of such refusal. Such refusal must always be express.

12. The Testing Party shall provide the Designated Personnel Team Leader or his designated representative at all times access to:

(a) telephone communications between the embassy of the Verifying Party in the territory of the Testing Party and the working facilities and living

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accommodations of Designated Personnel at each test site and each Designated Seismic Station; and

(b) an international telephone network from their working facilities and living accommodations at each test site and each Designated Seismic Station.

13. The Designated Personnel Team Leader or his designated representative shall have the right to use at all times satellite communications to ensure communications via the International Maritime Satellite Organization (INMARSAT) commercial satellite system, or a system of equivalent performance, between each test site in the territory of the Testing Party and the telephone communications system of the Verifying Party. If the Testing Party does not provide such communications, Designated Personnel shall have the right to use their own equipment specified in paragraph 1(k) of Section VIII of this Protocol. In this case, installation and alignment of all such equipment shall be done jointly. All equipment of this system, except the remote control unit, shall be locked and placed under seals of both Parties, and personnel of neither Party shall have access to this equipment except under observation of personnel of the other Party. Only Designated Personnel shall use the remote control unit. If the Verifying Party provides satellite communications equipment, personnel of the Testing Party shall have the right, under observation of Designated Personnel, to make the following modifications provided they do not degrade the quality of the communications:

(a) install bandpass filters, to limit the frequency range, in the antenna signal transmission and reception lines;

(b) modify the remote control unit to prevent manual tuning; and

(c) modify the satellite communications equipment to allow the Testing Party to monitor all transmissions.

14. The Testing Party shall provide the following for use by Designated Personnel:

(a) portable radios for communications at the test location;

(b) telephones for communications between work areas and between work areas and living quarters of Designated Personnel at the test site or Designated Seismic Stations; and

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(c) access to Testing Party-controlled vehicle-mounted radios for communications with the test location, work areas, or living quarters while Designated Personnel are in transit at the test site.

15. At the test site and each Designated Seismic Station, Designated Personnel shall observe all safety rules and regulations applicable to the personnel of the Testing Party, as well as all those additional restrictions with regard to access and movement as may be established by the Testing Party. Designated Personnel shall have access only to the areas in which they will directly exercise their rights and functions in accordance with Sections V, VI, VII, and VIII of this Protocol. The areas at the test site or the Designated Seismic Station in which Designated Personnel shall have freedom of movement during the conduct of a specific test without the mandatory escort of personnel of the Testing Party shall be marked on the diagrams of the test site or the Designated Seismic Stations provided to the Verifying Party at the first meeting of the Coordinating Group specified in paragraph 10 of Section XI of this Protocol. In all other cases, the permission of the Representative of the Testing Party, and escort by, personnel of the Testing Party shall be required.

16. Designated Personnel shall not be given or seek access by physical, visual, or technical means to the interior of any explosive canister, to documentary or other information descriptive of the design of an explosive, or to equipment for control and firing of an explosive. The Testing Party shall not locate documentary or other information descriptive of the design of an explosive in such ways as to impede Designated Personnel in carrying out their activities in accordance with this Protocol.

17. Possession or use by Designated Personnel of firearms, ammunition, or substances containing narcotics, with the exception of those prescribed by a physician, in the territory of the Testing Party is prohibited. Except as otherwise provided in this Protocol, possession or use by Designated Personnel of the following items is also prohibited at the test site or a Designated Seismic Station:

- (a) photographic and video recording equipment;
- (b) radio transmitters or receivers other than those supplied by the Testing Party;
- (c) sound recorders;
- (d) teleoptical devices; and
- (e) personal computers.

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18. Except as otherwise provided in this Protocol or as may be approved in writing by the Representative of the Testing Party, Designated Personnel are prohibited from removing any of the following items from the test site or a Designated Seismic Station:

- (a) soil samples;
- (b) plant samples;
- (c) water and air samples;
- (d) animals;
- (e) metal objects; and
- (f) rock samples or debris.

19. Designated Personnel shall have the right to remove from the territory of the Testing Party all items, including data, obtained in accordance with this Protocol.

20. The Testing Party shall have the right to inspect, in the presence of Designated Personnel, baggage and personal possessions of Designated Personnel upon their entry to or departure from the test site or Designated Seismic Stations. The Testing Party shall also have the right to inspect, in the presence of Designated Personnel, any packages received by Designated Personnel during their stay at the test site or Designated Seismic Stations or prepared for shipment by Designated Personnel from the test site or Designated Seismic Stations.

21. Except as provided in paragraphs 22, 23, and 24 of this Section or unless the Parties otherwise agree, the Verifying Party shall bear all costs of verification activities of Designated Personnel and Transport Personnel set forth in the coordinated schedule, including costs for use or consumption of materials, equipment, transportation, food, living and working facilities, medical assistance, communications, and services requested by and provided to the Verifying Party. The Verifying Party shall also bear the costs associated with transport aircraft in accordance with paragraph 5 of this Section.

22. The Testing Party shall bear all costs related to the preparation of its test sites, Designated Seismic Stations, and equipment storage facilities within its territory for the use of Designated Personnel as provided for in this Protocol.

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23. With respect to a test of non-standard configuration:

(a) the Testing Party shall bear the costs of the activities specified in paragraph 6(a) of Section V of this Protocol that are carried out with respect to the second and third satellite holes, if requested by the Verifying Party in accordance with paragraph 11 of Section XI of this Protocol; and

(b) the Testing Party shall bear the costs related to the conduct of a test identified by it as a reference test to satisfy the request of the Verifying Party in accordance with paragraph 11 of Section XI of this Protocol.

24. The Testing Party shall bear all costs related to transportation of equipment of the Verifying Party between:

(a) the point of entry and the location at which such equipment is subject to familiarization or inspection by the Testing Party in accordance with Section VIII of this Protocol;

(b) the location for familiarization or inspection by the Testing Party and the location at which such equipment is returned to the Verifying Party;

(c) the location at which such equipment is turned over to the Testing Party for storage and the storage location; and

(d) the storage location and the location at which such equipment is returned to the Verifying Party.

25. If the Verifying Party decides not to carry out activities related to verification that it specified in its initial notification, after technical and logistical support for these activities has been agreed upon in the Coordinating Group in accordance with paragraph 12 of Section XI of this Protocol, the Verifying Party shall reimburse the Testing Party for the costs of such agreed technical and logistical support incurred by the Testing Party prior to receipt of notification that the Verifying Party will not carry out the initially declared activities related to verification.

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SECTION XI. PROCEDURES FOR CONSULTATION AND COORDINATION

1. For the purposes of implementation of the Treaty and this Protocol, the Parties shall, immediately following entry into force of the Treaty, establish a Bilateral Consultative Commission, within the framework of which they shall meet, at the request of either Party, to:

(a) consider any questions relating to implementation of the Treaty and this Protocol;

(b) consider any suggestions for amendments to the Treaty or this Protocol;

(c) consider any technical or administrative changes to this Protocol of the nature provided in paragraph 2, 3, or 4 of this Section;

(d) consider any questions relating to compliance with the Treaty and this Protocol;

(e) consider any new verification technologies having a bearing on the Treaty or this Protocol;

(f) seek agreement on those matters specified in this Protocol as requiring agreement of the Parties; and

(g) seek agreement on questions related to costs for verification activities and procedures for reciprocal payments of such costs between the Parties.

2. If the Parties determine that the periods of time specified with respect to notifications in Section IV of this Protocol create practical difficulties and do not serve the interest of effective implementation of this Protocol, they may change such periods of time by agreement in the Bilateral Consultative Commission. Such agreed changes shall not be considered amendments to the Treaty or this Protocol.

3. If the Parties determine that, in the interest of effective implementation of this Protocol, the arrangements set forth in Section X of this Protocol regarding transportation, lodging, food, and services require modification, the provisions of Section X of this Protocol may be changed by agreement of the Parties in the Bilateral Consultative Commission. Such agreed changes shall not be considered amendments to the Treaty or this Protocol.

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4. If the Parties determine that modifications to verification procedures, including modifications resulting from improvements in existing technologies, would enhance effective implementation of the basic aims of the Treaty or this Protocol, they may, in the Bilateral Consultative Commission, agree upon such modifications. Such agreed modifications shall not be considered amendments to the Treaty or this Protocol.

5. The Parties, through consultation, shall establish, and may amend as appropriate, regulations to govern the operations of the Bilateral Consultative Commission.

6. For each test with respect to which activities related to verification are carried out in accordance with this Protocol, the Parties shall establish a Coordinating Group of the Bilateral Consultative Commission that shall be responsible for coordinating the activities of the Verifying Party with the activities of the Testing Party. The Bilateral Consultative Commission may, as necessary, establish and amend procedures governing the activities of the Coordinating Group.

7. The Coordinating Group shall operate throughout the entire period of preparing and carrying out activities related to verification of a specific test, until departure of Designated Personnel from the territory of the Testing Party.

8. All members of the Coordinating Group from the Verifying Party shall be drawn from the list of Designated Personnel. The Representative of the Verifying Party to the Coordinating Group shall be the Principal Designated Personnel Team Leader, whose name shall be provided simultaneously with the notification of intent to carry out activities related to verification of a specific test. Within 15 days following receipt of this notification, the Testing Party shall provide the Verifying Party with the name of its Representative to the Coordinating Group.

9. The first meeting of the Coordinating Group shall be convened in the capital of the Testing Party within 25 days following notification by the Verifying Party that it intends to carry out activities related to verification of a specific test. Thereafter, the Coordinating Group shall meet at the request of either Party.

10. On the first day of the first meeting of the Coordinating Group, the Testing Party shall present a list, including times and durations, of all activities it intends to carry out that could affect the rights of the Verifying Party provided in this Protocol with respect to activities

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declared by it and related to verification of a specific test. If the Verifying Party has provided notification of its intent:

(a) to use the hydrodynamic yield measurement method or carry out an on-site inspection, the Testing Party shall provide the Verifying Party with the following information:

(i) the number of emplacement holes for the specific test;

(ii) with respect to each emplacement hole, whether, for the purposes of this Protocol, the emplacement hole shall be deemed vertical or horizontal; and

(iii) the number of explosions included in the test and the location of each planned end of each emplacement hole and of the corresponding planned emplacement point, to the nearest 10 meters;

(b) to use the hydrodynamic yield measurement method with respect to a test of standard configuration that includes more than one explosion, the Testing Party shall provide, in addition to the information specified in subparagraph (a) of this paragraph, the following information:

(i) whether any explosion has a planned yield exceeding 50 kilotons, and, if so, which explosion or explosions; and

(ii) whether any explosion has a planned yield exceeding 35 kilotons, and, if so, which explosion or explosions; and

(c) to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration, the Testing Party shall provide the information specified in subparagraphs (a) and (b) of this paragraph, as well as the following information:

(i) a detailed description, including dimensions, of each emplacement hole and any access or bypass tunnels connected to each emplacement hole if any portion of an access or bypass tunnel is within the hydrodynamic measurement zone;

(ii) the dimensions of each explosive canister and its orientation in the emplacement hole;

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(iii) the density and dimensions of each choke section; and

(iv) the location and configuration of any access or bypass tunnels and any known voids with a volume larger than one cubic meter, within 50 meters of the wall of each emplacement hole within the hydrodynamic measurement zone, and the bulk density of the stemming material if these voids are to be stemmed.

11. Within 15 days following the convening of the first meeting of the Coordinating Group, the Verifying Party shall provide the Testing Party, in the Coordinating Group, with a list of the activities it intends to carry out, as well as those activities provided for in this Protocol that it intends not to carry out. The Verifying Party shall also provide the Testing Party, in the Coordinating Group, with a preliminary statement of its requirements for technical and logistical support for the activities related to verification that it intends to carry out and whether it will require the Testing Party to provide the cables specified in paragraphs 3(a) and 3(b) of Section VIII of this Protocol for its use. If the Verifying Party has notified the Testing Party that it intends to use the hydrodynamic yield measurement method with respect to a test of non-standard configuration, the Verifying Party also shall inform the Testing Party:

(a) whether it requires a reference test; and

(b) whether it will actually carry out hydrodynamic yield measurements of the test of non-standard configuration, and, if so, which measurements, and:

(i) the number of satellite holes required and the specific distance and azimuth relative to the emplacement hole of the second and third satellite holes, if such are requested by the Verifying Party and, if the Testing Party is unable to prepare the first satellite hole in accordance with the conditions for such hole in the standard configuration, the distance and azimuth of that satellite hole relative to the emplacement hole; and

(ii) in which satellite holes the Verifying Party intends to use transducers and associated power supplies.

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12. Within 10 days following receipt by the Testing Party of the information specified in paragraph 11 of this Section, the Parties, in the Coordinating Group, shall develop and agree upon a coordinated schedule, which shall include specific times and durations for carrying out activities related to verification, ensuring the rights of each Party provided in this Protocol, and taking into account the number of Designated Personnel that will carry out activities related to verification of a specific test in accordance with Sections V, VI, and VII of this Protocol. The coordinated schedule shall reflect those numbers.

13. Agreement of the Representative of each Party to the Coordinating Group shall constitute agreement of the Parties for the purposes of this Protocol with the exception of paragraphs 3, 4, 5, 6, and 9 of Section III of this Protocol and paragraph 2 of Section XII of this Protocol.

14. Upon completion of activities related to verification of a specific test, the Designated Personnel Team Leader at the test site or at each Designated Seismic Station shall prepare a written report, in the language of each Party. The report shall be factual. It shall list activities carried out by Designated Personnel, with dates of their completion, and shall include lists of information, data, photographs, and samples obtained by Designated Personnel or provided by the Testing Party in accordance with this Protocol. The report shall list technical and logistical activities carried out by the Testing Party in support of activities related to verification. The Designated Personnel Team Leader shall include in the report comments on any ambiguities not resolved during the carrying out of activities related to verification. The Representative of the Testing Party may include in the report comments responding to these ambiguities. The Designated Personnel Team Leader shall complete the report prior to the scheduled departure of Designated Personnel from the test site or Designated Seismic Station. The Designated Personnel Team Leader and the Representative of the Testing Party shall each sign the report and retain a copy.

15. If, in the course of implementing activities related to verification of a specific test, in accordance with this Protocol, questions arise requiring prompt resolution, such questions shall be considered by the Coordinating Group. If the Coordinating Group is unable to resolve such questions, they shall immediately be referred to the Bilateral Consultative Commission for resolution.

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SECTION XII. RELEASE OF INFORMATION

1. Nothing in the Treaty and this Protocol shall affect the proprietary rights of either Party in information provided by it in accordance with the Treaty and this Protocol, or in information that may be disclosed to the other Party or that may become known to the other Party in preparing for or conducting a test. Claims to such proprietary rights, however, shall not impede implementation of the provisions of the Treaty and this Protocol.

2. Public release of the information provided in accordance with this Protocol or publication of material using such information may take place only with the agreement of the Testing Party. Public release of the results of observation or measurements made by Designated Personnel may take place only with the agreement of both Parties.

SECTION XIII. ENTRY INTO FORCE

This Protocol is an integral part of the Treaty. It shall enter into force on the date of entry into force of the Treaty and shall remain in force as long as the Treaty remains in force.

DONE at Washington, in duplicate, this first day of June, 1990, in the English and Russian languages, both texts being equally authentic.

FOR THE UNITED STATES
OF AMERICA:

FOR THE UNION OF SOVIET
SOCIALIST REPUBLICS:

President of the United
States of America

President of the Union of
Soviet Socialist Republics

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CONFERENCE ON DISARMAMENT

CD/1067
8 March 1991

Original: ENGLISH

LETTER DATED 28 FEBRUARY 1991 FROM THE REPRESENTATIVE
OF THE UNITED STATES OF AMERICA ADDRESSED TO THE PRESIDENT
OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF
THE 1976 TREATY BETWEEN THE UNITED STATES OF AMERICA AND
THE UNION OF SOVIET SOCIALIST REPUBLICS ON UNDERGROUND
NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES, TOGETHER WITH
ITS PROTOCOL */

I have the honour to forward to you the 1976 Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, together with its Protocol, which entered into force following the exchange of instruments of ratification on 11 December 1990.

In accordance with the past practice, Minister Batsanov, USSR Representative to the Conference on Disarmament, will transmit these documents in Russian to the Conference on Disarmament.

I ask that you take the appropriate steps to issue this treaty text as an official document of the Conference on Disarmament and have it distributed to all member delegations and non-member States participating in the work of the Conference.

(Signed) Stephen J. Ledogar
Representative of the
United States of America
to the Conference on
Disarmament

*/ The official Russian text of the above-mentioned Treaty together with its Protocol is to be found in CD/1069.

Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes

Signed at Washington and Moscow May 28, 1976

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Proceeding from a desire to implement Article III of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, which calls for the earliest possible conclusion of an agreement on underground nuclear explosions for peaceful purposes,

Reaffirming their adherence to the objectives and principles of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, the Treaty on Non-Proliferation of Nuclear Weapons, and the Treaty on the Limitation of Underground Nuclear Weapon Tests, and their determination to observe strictly the provisions of these international agreements,

Desiring to assure that underground nuclear explosions for peaceful purposes shall not be used for purposes related to nuclear weapons,

Desiring that utilization of nuclear energy be directed only toward peaceful purposes,

Desiring to develop appropriately cooperation in the field of underground nuclear explosions for peaceful purposes,

Have agreed as follows:

Article I

1. The Parties enter into this Treaty to satisfy the obligations in Article III of the Treaty on the Limitation of Underground Nuclear Weapon Tests, and assume additional obligations in accordance with the provisions of this Treaty.

2. This Treaty shall govern all underground nuclear explosions for peaceful purposes conducted by the Parties after March 31, 1976.

Article II

For the purposes of this Treaty:

(a) "explosion" means any individual or group underground nuclear explosion for peaceful purposes;

(b) "explosive" means any device, mechanism or system for producing an individual explosion;

(c) "group explosion" means two or more individual explosions for which the time interval between successive individual explosions does not exceed five seconds and for which the emplacement points of all explosives can be interconnected by straight line segments, each of which joins two emplacement points and each of which does not exceed 40 kilometers.

Article III

1. Each Party, subject to the obligations assumed under this Treaty and other international agreements, reserves the right to:

(a) carry out explosions at any place under its jurisdiction or control outside the geographical boundaries of test sites specified under the provisions of the Treaty on the Limitation of Underground Nuclear Weapon Tests; and

(b) carry out, participate or assist in carrying out explosions in the territory of another State at the request of such other State.

2. Each Party undertakes to prohibit, to prevent and not to carry out at any place under its jurisdiction or control, and further undertakes not to carry out, participate or assist in carrying out anywhere:

(a) any individual explosion having a yield exceeding 150 kilotons;

(b) any group explosion:

(1) having an aggregate yield exceeding 150 kilotons except in ways that will permit identification of each individual explosion and determination of the yield of each individual explosion in the group in accordance with the provisions of Article IV of and the Protocol to this Treaty;

(2) having an aggregate yield exceeding one and one-half megatons;

(c) any explosion which does not carry out a peaceful application;

(d) any explosion except in compliance with the provisions of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, the Treaty on the Non-Proliferation of Nuclear Weapons, and other international agreements entered into by that Party.

3. The question of carrying out any individual explosion having a yield exceeding the yield specified in paragraph 2(a) of this article will be considered by the Parties at an appropriate time to be agreed.

Article IV

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall:

(a) use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law; and

(b) provide to the other Party information and access to sites of explosions and furnish assistance in accordance with the provisions set forth in the Protocol to this Treaty.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1(a) of this article, or with the implementation of the provisions of paragraph 1(b) of this article.

Article V

1. To promote the objectives and implementation of the provisions of this Treaty, the Parties shall establish promptly a Joint Consultative Commission within the framework of which they will:

(a) consult with each other, make inquiries and furnish information in response to such inquiries, to assure confidence in compliance with the obligations assumed;

(b) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;

(c) consider questions involving unintended interference with the means for assuring compliance with the provisions of this Treaty;

(d) consider changes in technology or other new circumstances which have a bearing on the provisions of this Treaty; and

(e) consider possible amendments to provisions governing underground nuclear explosions for peaceful purposes.

2. The Parties through consultation shall establish, and may amend as appropriate, Regulations for the Joint Consultative Commission governing procedures, composition and other relevant matters.

Article VI

1. The Parties will develop cooperation on the basis of mutual benefit, equality, and reciprocity in various areas related to carrying out underground nuclear explosions for peaceful purposes.

2. The Joint Consultative Commission will facilitate this cooperation by considering specific areas and forms of cooperation which shall be determined by agreement between the Parties in accordance with their constitutional procedures.

3. The Parties will appropriately inform the International Atomic Energy Agency of results of their cooperation in the field of underground nuclear explosions for peaceful purposes.

Article VII

1. Each Party shall continue to promote the development of the international agreement or agreements and procedures provided for in Article V of the Treaty on the Non-Proliferation of Nuclear Weapons, and shall provide appropriate assistance to the International Atomic Energy Agency in this regard.

2. Each Party undertakes not to carry out, participate or assist in the carrying out of any explosion in the territory of another State unless that State agrees to the implementation in its territory of the international observation and procedures contemplated by Article V of the Treaty on the Non-Proliferation of Nuclear Weapons and the provisions of Article IV of and the Protocol to this Treaty, including the provision by that State of the assistance necessary for such implementation and of the privileges and immunities specified in the Protocol.

Article VIII

1. This Treaty shall remain in force for a period of five years, and it shall be extended for successive five-year periods unless either Party notifies the other of its termination no later than six months prior to its expiration. Before the expiration of this period the Parties may, as necessary, hold consultations to consider the situation relevant to the substance of this Treaty. However, under no circumstances shall either Party be entitled to terminate this Treaty while the Treaty on the Limitation of Underground Nuclear Weapon Tests remains in force.

2. Termination of the Treaty on the Limitation of Underground Nuclear Weapon Tests shall entitle either Party to withdraw from this Treaty at any time.

3. Each Party may propose amendments to this Treaty. Amendments shall enter into force on the day of the exchange of instruments of ratification of such amendments.

Article IX

1. This Treaty including the Protocol which forms an integral part hereof, shall be subject to ratification in accordance with the constitutional procedures of each Party. This Treaty shall enter into force on the day of the exchange of instruments of ratification which exchange shall take place simultaneously with the exchange of instruments of ratification of the Treaty on the Limitation of Underground Nuclear Weapon Tests.

2. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

DONE at Washington and Moscow, on May 28, 1976, in duplicate, in the English and Russian languages, both texts being equally authentic.

For the United States of America:

GERALD R. FORD,

The President of the United States of America.

For the Union of Soviet Socialist Republics:

L. BREZHNEV,

General Secretary of the Central Committee of the CPSU.

PROTOCOL TO THE TREATY BETWEEN
THE UNITED STATES OF AMERICA AND
THE UNION OF SOVIET SOCIALIST REPUBLICS
ON UNDERGROUND NUCLEAR EXPLOSIONS
FOR PEACEFUL PURPOSES

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Confirming the provisions of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes of May 28, 1976, hereinafter referred to as the Treaty,

Taking into account the fact that nuclear explosions for peaceful purposes are conducted outside national nuclear test sites under various geological conditions,

Convinced of the necessity to ensure effective verification of compliance with the Treaty,

Have agreed as follows:

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SECTION I. DEFINITIONS

In addition to the definitions of terms set forth in Article II of the Treaty, for the purposes of this Protocol:

1. The term "emplacement hole" means the entire interior of any drill hole, shaft, adit or tunnel in which an explosive, associated cables, and other equipment are installed for the purposes of carrying out an explosion.
2. The term "Verifying Party" means the Party entitled to carry out, in accordance with this Protocol, activities related to verification of compliance with the Treaty by the Party carrying out an explosion.
3. The term "Designated Personnel" means personnel appointed by the Verifying Party from among its nationals and included on its list of Designated Personnel, in accordance with Section IX of this Protocol, to carry out activities related to verification, in accordance with this Protocol, in the territory of the Party carrying out the explosion.
4. The term "Transport Personnel" means personnel appointed by the Verifying Party from among its nationals and included on its list of Transport Personnel, in accordance with Section IX of this Protocol, to provide transportation for Designated Personnel, their baggage, and equipment of the Verifying Party between the territory of the Verifying Party and the point of entry in the territory of the Party carrying out the explosion.
5. The term "point of entry" means Washington, D.C. (Dulles International Airport) with respect to the United States of America; and Moscow (Sheremetyevo-2 Airport) with respect to the Union of Soviet Socialist Republics. Other locations may serve as points of entry for specific explosions, as agreed by the Parties.
6. The term "on-site inspection" means activities carried out by the Verifying Party in the territory of the Party carrying out the explosion, in accordance with Section VII of this Protocol, for the purposes of independently obtaining data on conditions under which the explosion will be conducted and confirming the validity of data provided by the Party carrying out the explosion.
7. The term "hydrodynamic yield measurement method" means the method whereby the yield of an explosion is derived from on-site, direct measurement of the position

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of the shock front as a function of time during the hydrodynamic phase of the ground motion produced by the explosion.

8. The term "local seismic network" means the array of seismic stations and the control point temporarily deployed, in accordance with this Protocol, for the purpose of identifying the number of individual explosions in a specific group explosion.

9. The term "Joint Consultative Commission" means the Commission established in accordance with Article V of the Treaty.

10. The term "Coordinating Group" means a working group of the Joint Consultative Commission, established in accordance with Section XI of this Protocol.

11. The term "Nuclear Risk Reduction Centers" means the Centers located in Washington, D.C., and Moscow, established in accordance with the Agreement Between the United States of America and the Union of Soviet Socialist Republics on the Establishment of Nuclear Risk Reduction Centers of September 15, 1987.

SECTION II. EXPLOSION DEPTH AND COMPOSITION

1. No explosion shall be conducted at a distance in meters from the ground surface less than 30 times the 3.4 root of the planned yield of that explosion in kilotons.

2. No group explosion shall have an aggregate yield exceeding 150 kilotons unless the Parties agree on specific procedures to implement appropriate provisions of this Protocol so as to permit identification of each individual explosion and determination of the yield of each individual explosion in the group.

3. No explosion having a planned yield exceeding 35 kilotons shall be conducted in a cavity having a volume exceeding 20,000 cubic meters, unless the Parties agree on verification measures for such an explosion.

SECTION III. VERIFICATION MEASURES

1. For the purposes of the Treaty, all underground nuclear explosions conducted outside national nuclear test

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sites shall be considered underground nuclear explosions for peaceful purposes subject to all the provisions of the Treaty. For purposes of verification of compliance with the Treaty, in addition to using available national technical means, the Verifying Party shall have the right:

(a) to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, to measure the yield of each explosion that the Party carrying out the explosion notifies, in accordance with paragraph 3 of Section IV of this Protocol, to have a planned yield exceeding 50 kilotons;

(b) to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, to monitor the yield of each individual explosion in a group explosion that the Party carrying out the explosion notifies, in accordance with paragraph 3 of Section IV of this Protocol, to have a planned aggregate yield exceeding 50 kilotons;

(c) to use, in conjunction with the use of the hydrodynamic yield measurement method, a local seismic network, in accordance with Section VI of this Protocol, for each group explosion that the Party carrying out the explosion notifies, in accordance with paragraph 3 of Section IV of this Protocol, to have a planned aggregate yield exceeding 150 kilotons; and

(d) to carry out on-site inspection, in accordance with Section VII of this Protocol, with respect to any explosion that the Party carrying out the explosion notifies, in accordance with paragraph 3 of Section IV of this Protocol, to have a planned yield exceeding 35 kilotons and, with respect to any explosion having a planned yield exceeding 50 kilotons, only if the Verifying Party has decided not to use the hydrodynamic yield measurement method.

2. The Party carrying out the explosion shall bear full responsibility for, and have exclusive control over, the conduct of the explosion.

3. Designated Personnel shall be responsible for the working of their equipment, its timely installation and operation, for participating in such operations, including dry runs, as the Party carrying out the explosion may request, and for recording data at the time of the explosion. The Party carrying out the explosion shall be under no obligation to change the time of the explosion because of any malfunction of the equipment of the Verifying Party or inability of Designated Personnel to carry out their functions, unless actions of the Party carrying out the explosion have caused such a situation to arise.

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SECTION IV. NOTIFICATIONS AND INFORMATION
RELATING TO EXPLOSIONS

1. Unless the Parties otherwise agree, all notifications provided for in this Protocol shall be transmitted through the Nuclear Risk Reduction Centers. The Nuclear Risk Reduction Centers may also be used, as appropriate, to transmit other information provided in accordance with this Protocol.

2. Not later than July 1 following entry into force of the Treaty, and each July 1 thereafter, each Party shall inform the other Party whether or not it intends to conduct, during the following calendar year, any individual or group explosion for peaceful purposes having a planned aggregate yield exceeding 35 kilotons, and, if so, how many. On the date of entry into force of the Treaty, information specified by this paragraph shall be provided by each Party for the remainder of the calendar year in which the Treaty enters into force and for the period from January 1 through December 31 of the succeeding year. In the event of changes in the information provided in accordance with this paragraph, such changes shall be immediately provided to the other Party.

3. No less than 180 days prior to the planned date of the beginning of emplacement of the explosive or explosives for every explosion having a planned yield exceeding 35 kilotons, the Party carrying out the explosion shall notify the Verifying Party of its intention to carry out the explosion and shall provide the Verifying Party with the following information, to the extent and degree of accuracy available at the time when it is provided:

- (a) the planned date of the explosion;
- (b) the planned date of the beginning of emplacement of the explosive or explosives;
- (c) the purpose of the explosion;
- (d) the location of the explosion, expressed in geographic coordinates to the nearest minute;
- (e) the planned yield of the explosion;
- (f) the number of explosives, and the planned yield of each individual explosive;
- (g) the planned depth of emplacement of each explosive to the nearest 10 meters;

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(h) the type or types of rock in which the explosion will take place, including the depth of the water table; and

(i) a description of specific technological features of the project of which the explosion is a part that may affect determination of its yield and confirmation of its purpose.

4. Following receipt of information specified in paragraph 3 of this Section, the Verifying Party shall inform the Party carrying out the explosion, no less than 150 days prior to the planned date of the beginning of emplacement of explosives, in a single notification, whether or not it intends to carry out one of the following activities related to verification:

(a) with respect to an explosion having a planned yield exceeding 35 kilotons, to carry out on-site inspection in accordance with Section VII of this Protocol; or

(b) with respect to an explosion having a planned yield exceeding 50 kilotons, to use the hydrodynamic yield measurement method, in accordance with Section V of this Protocol, and, with respect to a group explosion having a planned aggregate yield exceeding 150 kilotons, to use, in conjunction with the hydrodynamic yield measurement method, a local seismic network, in accordance with Section VI of this Protocol.

5. If the Verifying Party:

(a) declares its intention not to conduct activities described in paragraphs 4(a) and 4(b) of this Section, it shall thereby forfeit its right to conduct such activities unless the Party carrying out the explosion provides notification, in accordance with paragraph 9 of this Section, of a change in the location by more than one minute of latitude or longitude or of a change in the planned date of the explosion that changes the date indicated in the initial notification by 60 days or more. Within 30 days of notification by the Party carrying out the explosion of any such change in location or planned date of the explosion, the Verifying Party shall have the right to revise the notification it provided in accordance with paragraph 4 of this Section. In the event the Verifying Party elects to revise its notification and to use the hydrodynamic yield measurement method or to carry out on-site inspection, the beginning of emplacement of explosives shall not

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occur less than 90 days from the date of the Verifying Party's revised notification, unless the Parties otherwise agree. The Party carrying out the explosion shall thereafter provide the Verifying Party with the information specified in paragraph 6 or 7 of this Section; or

(b) decides not to conduct the activities related to verification specified by it in its initial notification, after technical and logistical support requirements for these activities have been agreed upon in the Coordinating Group, in accordance with paragraph 6 of Section XI of this Protocol, the Verifying Party shall reimburse the Party carrying out the explosion for costs for such technical and logistical support incurred by the Party carrying out the explosion prior to receipt of notification that the Verifying Party will not carry out the initially-declared activities related to verification.

6. In the event of receipt by the Party carrying out the explosion of notification from the Verifying Party of its intent to use the hydrodynamic yield measurement method, the Party carrying out the explosion shall provide the Verifying Party not less than 60 days prior to the planned date of the beginning of emplacement of explosives with the following information:

(a) the number of explosives; the planned yield of each explosive; the planned depth of emplacement of each explosive with an accuracy of 10 meters; the planned point of emplacement of each explosive to be used in a group explosion relative to all other explosives in the group with an accuracy of 10 percent of the distance between that explosive and the nearest other explosive, but in no case shall the error be greater than 100 meters; and the planned time intervals between individual explosions in each group explosion with an accuracy of 0.1 second;

(b) a description of the geological and geophysical characteristics of the site of each explosion that could influence determination of the yield, which shall include: the depth of the water table; a stratigraphic column above each emplacement point; the position of each emplacement point relative to nearby geological and other features that influenced the design of the project of which the explosion is a part; and the estimated physical parameters of the rock within each hydrodynamic measurement zone, including bulk density, grain density, compressional and shear-wave velocities, porosity, and total water content;

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(c) the locations and purposes of facilities and installations that are associated with the conduct of the explosion;

(d) the planned date of the beginning of emplacement of each explosive;

(e) a topographic chart, marked with geographic coordinates accurate to one minute of latitude and longitude, of the areas circumscribed by circles of 15 kilometer radius centered on points on the surface of the earth above the points of emplacement of each explosive, at a scale of 1:24,000 or 1:25,000 with a contour interval of 10 meters or less. The planned location of each explosive shall be marked on this chart with an accuracy of 50 meters;

(f) the length of each canister in which an explosive will be contained, hereinafter referred to as an explosive canister;

(g) the dimensions of any pipe or other device that will be used to emplace each explosive canister;

(h) the planned cross-sectional dimensions of each emplacement hole within the hydrodynamic measurement zones;

(i) a description of materials, including their densities, to be used to stem the emplacement hole within each hydrodynamic measurement zone; and

(j) the location and configuration of any known voids larger in volume than one cubic meter within each hydrodynamic measurement zone.

7. In the event of receipt by the Party carrying out the explosion of notification from the Verifying Party of its intent to carry out on-site inspection, the Party carrying out the explosion shall provide the Verifying Party, not less than 60 days prior to the planned date of the beginning of emplacement of explosives, with the following information:

(a) the number of explosives; the planned yield of each explosive; the planned depth of emplacement of each explosive with an accuracy of 10 meters; the planned point of emplacement of each explosive to be used in a group explosion relative to all other explosives in the group with an accuracy of 10 percent of the distance between that explosive and the nearest other explosive, but in no case shall the error be

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greater than 100 meters; and the planned time intervals between individual explosions in each group explosion with an accuracy of 0.1 second;

(b) a description of the geological and geophysical characteristics of the site of each explosion that could influence determination of the yield, which shall include: the depth of the water table; a lithologic column above each emplacement point; the position of each emplacement point relative to nearby geological and other features that influenced the design of the project of which the explosion is a part; and the estimated physical parameters of the rock within each hydrodynamic measurement zone, including bulk density, grain density, porosity, and total water content;

(c) the locations and purposes of facilities and installations that are associated with the conduct of the explosion;

(d) the planned date of the beginning of emplacement of each explosive;

(e) a topographic chart, marked with geographic coordinates accurate to one minute of latitude and longitude, of the areas circumscribed by circles of 15 kilometer radius centered on points on the surface of the earth above the points of emplacement of each explosive, at a scale of 1:24,000 or 1:25,000 with a contour interval of 10 meters or less. The planned location of each explosive shall be marked on this chart with an accuracy of 50 meters;

(f) the planned cross-sectional dimensions of each emplacement hole within the hydrodynamic measurement zones; and

(g) the location and configuration of any known voids larger in volume than one cubic meter within each hydrodynamic measurement zone.

8. For each explosion, the Party carrying out the explosion shall inform the Verifying Party, no less than two days prior to the explosion, of the planned time of detonation of each explosive, with an accuracy of 0.1 second. In the event the Party carrying out the explosion decides to change the detonation time, the Verifying Party shall be notified of this change immediately after this decision has been taken. No more than 10 days following the explosion the Verifying Party shall be informed of the actual detonation time.

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9. The Party carrying out the explosion shall immediately notify the Verifying Party of any change in any information provided in accordance with paragraph 3, 6, or 7 of this Section. If the Verifying Party has provided notification under paragraph 4 of this Section of its decision to use the hydrodynamic yield measurement method or to carry out on-site inspection, the emplacement of explosives shall not begin less than 90 days following notification of any change in any information provided in accordance with paragraph 3, 6, or 7 of this Section that requires more extensive verification procedures than are required on the basis of initial information, unless an earlier date for the beginning of emplacement of explosives has been agreed upon by the Parties. Such changes include:

- (a) change in the location of the explosion by more than one minute of latitude or longitude;
- (b) change in the number of explosives in a group explosion;
- (c) change in the yield of the explosion;
- (d) change in the purpose of the explosion; and
- (e) delay in the planned date of the explosion by more than 90 days.

10. In using an explosion to decrease the consequences of an emergency situation related to an unforeseen set of circumstances and requiring immediate action, by virtue of which it would be practically impossible to adhere to the requirements of paragraph 3 of this Section concerning the time period, the following conditions shall be fulfilled:

- (a) the Party making the decision to carry out an explosion for such a purpose shall notify the Verifying Party of this decision immediately after it has been made and shall describe the circumstances and provide the planned yield for such an explosion;
- (b) the planned aggregate yield for such an explosion shall not exceed 100 kilotons and the explosion shall not include more than three individual explosions, unless the Parties otherwise agree;
- (c) the Party carrying out such an explosion shall provide the Verifying Party with the information specified in paragraphs 3 and 6 of this Section, to the extent such information is available, after making the decision on carrying out the explosion, but no less than 60 days prior to the beginning of emplacement of explosives; and

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(d) if, within 15 days following receipt of notification of such an explosion, the Verifying Party has made the decision to carry out verification of that explosion using the hydrodynamic yield measurement method, it shall deliver hydrodynamic yield measurement equipment to the point of entry in the territory of the Party carrying out the explosion no less than 35 days prior to the planned date of the beginning of emplacement of explosives, in accordance with paragraphs 8(b), 8(c), 8(d), 8(e), and 8(f) of Section VIII of this Protocol. This equipment shall be handed over, in the same condition as that in which it was received, to Designated Personnel at the site of the explosion for emplacement, installation, and use no less than 20 days prior to the planned date of the beginning of emplacement of explosives.

11. The Party carrying out an explosion shall have the right to make changes in the schedule of operations related to the conduct of the explosion. In the event the Verifying Party exercises its rights to use the hydrodynamic yield measurement method or to carry out on-site inspection, in accordance with Section III of this Protocol, the Party carrying out the explosion shall immediately inform the Verifying Party of any such change in the schedule of operations. In the event the Verifying Party has provided notification, under paragraph 4 of this Section, of its decision to use the hydrodynamic yield measurement method or to carry out on-site inspection, the explosion shall not be carried out more than five days prior to the planned date of the explosion indicated in the initial notification, unless the Parties otherwise agree.

12. The Verifying Party may at any time, but no more than one year after the explosion, request from the Party carrying out the explosion clarification of any point of information provided in accordance with this Section. Such clarification shall be provided in the shortest possible time, but no more than 30 days following receipt of a request.

SECTION V. HYDRODYNAMIC YIELD MEASUREMENT METHOD

1. The hydrodynamic measurement zone for each explosive means a cylindrical region coaxial with the emplacement hole of that explosive. This region extends in the direction of the entrance to the emplacement hole from the midpoint of the canister containing that explosive to the point at which the axis of the emplacement hole intersects a spherical surface whose radius, measured from

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the midpoint of the canister containing the explosive, is equal in meters to 10 times the cube root of the planned yield in kilotons of that explosive, or 25 meters, whichever is greater. The length of this region in the opposite direction from the same midpoint of the canister is equal in meters to three times the cube root of the planned yield in kilotons of that explosive, or 7.5 meters, whichever is greater. The radius of this region is equal in meters to three times the cube root of the planned yield in kilotons of that explosive, or 7.5 meters, whichever is greater.

2. For hydrodynamic yield measurement the following procedures shall apply:

(a) Designated Personnel shall emplace, for each explosive, the equipment specified in paragraph 5(a) of Section VIII of this Protocol in the same emplacement hole as the explosive. The equipment specified in paragraphs 5(a) and 5(b) of Section VIII of this Protocol shall be installed, in accordance with installation instructions provided in accordance with paragraph 8(a)(i) of Section VIII of this Protocol, by Designated Personnel under observation of personnel of the Party carrying out the explosion and with their assistance, if Designated Personnel have requested such assistance. The location of each recording facility and the command and monitoring facility of the Verifying Party shall be determined by agreement of the Parties with respect to each particular explosion. This equipment shall be operated by Designated Personnel;

(b) for each explosive, the equipment specified in paragraph 5(a) of Section VIII of this Protocol shall be installed so that the end point of the equipment farthest from the emplacement hole entrance is three meters from the surface of the explosive canister closest to the emplacement hole entrance as measured along the axis of the emplacement hole. The location of this equipment relative to the axis of the emplacement hole shall be agreed upon by the Parties. No more than six sensor channels shall be installed for each explosive. Each Party shall make documented records of measured distances to the sensors. These records shall be exchanged by the Parties;

(c) explosive canisters with a length greater than 10 meters or a diameter greater than three meters shall be used only if prior agreement has been reached between the Parties establishing, in each specific case, provisions for their use; and

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(d) the Party carrying out the explosion shall fill all voids other than the explosive canister within the hydrodynamic measurement zone of each explosive in each emplacement hole with stemming material. This stemming material, beginning no more than three meters from each explosive canister cover towards the entrance of the hole, and proceeding in that direction, shall have a bulk density no less than 70 percent of the average density of the surrounding rock. An alternate stemming material may be used for filling the remainder of the hydrodynamic measurement zone of that explosive. For any explosive emplaced in an emplacement hole whose diameter is less than 30 centimeters and emplaced at a distance of more than 1.5 kilometers from the entrance of the hole, an alternate stemming material may be used for filling the entire hydrodynamic measurement zone of that explosive. If more than one explosive is emplaced in a single emplacement hole, the Parties shall agree upon an alternate stemming material for filling the entire hydrodynamic measurement zone of each explosive other than the explosive nearest the entrance of the emplacement hole if the emplacement hole diameter is greater than 30 centimeters but less than 60 centimeters. Any alternate stemming material shall have a bulk density no less than 1.2 grams per cubic centimeter. Pipes located within the hydrodynamic measurement zone need not be filled with stemming material if they have a cross-sectional area less than 10 square centimeters, or if they have a cross-sectional area less than 100 square centimeters and a length less than one meter. Costs incurred by the Party carrying out the explosion to ensure, within the hydrodynamic measurement zone, a density of stemming material no less than 70 percent of the average density of the surrounding rock shall be borne by the Verifying Party.

3. For a group explosion the Party carrying out the explosion shall ensure that the emplacement point of each explosive canister, the detonation sequence, and the time intervals between individual explosions are such that no explosion in the group shall interfere with the hydrodynamic yield measurement of any other individual explosion. With the exception of group explosions provided for in paragraph 2 of Section II of this Protocol, if the technological characteristics of the project of which the group explosion is a part make it impossible to satisfy this requirement, the Parties, prior to the beginning of emplacement of explosives, shall agree upon alternative hydrodynamic or other verification procedures.

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4. In preparation for the use of the hydrodynamic yield measurement method, the Verifying Party shall have the right to confirm the validity of the geological and geophysical information provided in accordance with Section IV of this Protocol, in accordance with the following procedures:

(a) Designated Personnel may analyze relevant studies and measurement data, including logging data, of the Party carrying out the explosion, the core samples or rock fragments extracted from each emplacement hole within the hydrodynamic measurement zone, as well as any logging data and core samples from existing exploratory holes, which shall be provided to Designated Personnel upon their arrival at the explosion site, if the Party carrying out the explosion carried out relevant studies, measurements, and coring; and

(b) Designated Personnel shall have the right to observe logging and the extraction of core samples or rock fragments from locations agreed upon by the Parties within the hydrodynamic measurement zone in the emplacement hole or from an exploratory hole at depth intervals agreed upon by the Parties. Any such exploratory hole shall be no farther from the emplacement hole than a distance in meters of 10 times the cube root of the planned yield in kilotons of the emplaced explosive; or

(c) if the Party carrying out the explosion does not take core samples or rock fragments in accordance with subparagraph (b) of this paragraph or does not drill an exploratory hole meeting the requirements specified in subparagraph (b) of this paragraph, the Verifying Party shall have the right to extract sidewall rock samples from the emplacement hole with its own equipment, to drill such an exploratory hole, and to core this hole. Such operations shall be conducted in the presence of personnel of the Party carrying out the explosion. Such an exploratory hole shall be stemmed by the Party carrying out the explosion, at the expense of the Verifying Party; and

(d) Designated Personnel shall have the right to examine and remove from the territory of the Party carrying out the explosion logging data, core samples, sidewall rock samples, and rock fragments referred to in subparagraphs (a), (b), and (c) of this paragraph, as selected by Designated Personnel.

5. While using the hydrodynamic yield measurement method, Designated Personnel shall have the right:

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(a) to confirm by direct measurement the validity of the information provided in accordance with paragraphs 6(f), 6(g), and 6(h) of Section IV of this Protocol;

(b) to confirm the validity of the information provided in accordance with paragraph 6(i) of Section IV of this Protocol, and to receive, upon request, a sample of each batch of stemming material as this material is placed in the emplacement hole within the hydrodynamic measurement zone; and

(c) to confirm the validity of the information provided in accordance with paragraphs 6(b) and 6(j) of Section IV of this Protocol, by observing, upon request, relevant field measurements being made by the Party carrying out the explosion if such measurements are made by the Party carrying out the explosion, and by making field measurements with its own logging equipment, to include determination of the location and configuration of any voids within each hydrodynamic measurement zone or, at the option of the Verifying Party under leasing conditions, with the logging equipment of the Party carrying out the explosion, if the Party carrying out the explosion has such equipment. Such field measurements shall be made in the presence of personnel of both Parties. All of the data produced by either Party, including calibration data, shall be duplicated, and one copy of the data shall be provided to each Party. Calibration data for the equipment shall include information to confirm the sensitivity of the equipment under the conditions in which it is utilized for this explosion.

6. Designated Personnel shall have the right:

(a) to have access to the site of the explosion and to facilities and structures related to the conduct of the explosion, along agreed routes;

(b) to observe the emplacement of each explosive canister, to confirm, by direct measurement, the depth of emplacement of each explosive canister and, for explosives in a group, the relative location of their points of emplacement, and to observe the stemming of each emplacement hole;

(c) to have access to their equipment associated with the use of the hydrodynamic yield measurement method from commencement of its use by Designated Personnel at the explosion site until the departure of all personnel from the explosion area prior to the explosion;

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(d) to unimpeded visual observation of the entrance area to each emplacement hole at any time from the moment of emplacement of each explosive until the departure of all personnel from the explosion area prior to the explosion;

(e) to observe remotely by means of closed-circuit television equipment their hydrodynamic yield measurement equipment specified in paragraphs 5(b) and 5(c) of Section VIII of this Protocol;

(f) to observe the explosion; and

(g) to monitor electrically the integrity and performance of their equipment in each recording facility from the command and monitoring facility, to transmit the hydrodynamic yield measurement data from each recording facility to the command and monitoring facility, and to transmit the commands required for operation of each recording facility from the command and monitoring facility to each recording facility.

7. The Party carrying out the explosion shall produce, at the request of the Verifying Party, a timing reference command signal to each recording facility at two minutes, plus or minus 100 milliseconds, before the moment of the explosion, or before the first explosion in a group, and a zero-time reference signal to each corresponding recording facility for each explosion, with an accuracy of plus or minus one microsecond. The parameters for these signals, produced by the Party carrying out the explosion, and procedures for their transmission and reception shall be agreed upon by the Parties. At the Verifying Party's option, it shall have the right to generate a timing reference signal for each explosion, using the electromagnetic pulse from its hydrodynamic measurement cables. These timing reference signals shall be transmitted, used, and recorded by the Verifying Party without intervention by the Party carrying out the explosion.

8. Designated Personnel shall have the right to acquire photographs taken by the Party carrying out the explosion, with photographic cameras provided by the Verifying Party, under the following conditions:

(a) the Party carrying out the explosion shall identify those of its personnel who will take photographs;

(b) photographs shall be taken as requested by, and in the presence of, Designated Personnel. If requested by Designated Personnel, such photographs shall show the size of an object by placing a measuring

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scale, provided by the Verifying Party, alongside that object during the photographing;

(c) Designated Personnel shall determine whether photographs conform to those requested and, if not, repeat photographs shall be taken; and

(d) before completion of any photographed operation related to emplacement, and prior to the time at which an object being photographed becomes permanently hidden from view, Designated Personnel shall determine whether requested photographs are adequate. If they are not adequate, before the operation shall proceed, additional photographs shall be taken until the Designated Personnel determine that the photographs of that operation are adequate. This photographic process shall be carried out as expeditiously as possible, and in no case shall the cumulative delay resulting from this process exceed two hours for each emplacement operation, unless the Parties otherwise agree.

9. Designated Personnel shall have the right to obtain photographs of the following:

(a) the exterior of installations and structures associated with the conduct of the explosion;

(b) the emplacement of each explosive canister and stemming of each emplacement hole as specified in paragraph 6(b) of this Section;

(c) geological samples used for confirming the validity of geological and geophysical information as provided for in paragraph 4 of this Section, and equipment used in obtaining such samples;

(d) emplacement and installation of hydrodynamic yield measurement method equipment and cables associated with it;

(e) containers, facilities and structures for storing and operating the equipment used by Designated Personnel; and

(f) with the agreement of the Party carrying out the explosion, other activities of Designated Personnel directly related to the use of the hydrodynamic yield measurement method.

10. Equipment identified by the Party carrying out the explosion, in accordance with paragraph 8(h) of Section VIII of this Protocol, as unacceptable for use at the time of the

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explosion shall be sealed by both Parties and placed in the custody of the Party carrying out the explosion at a time agreed upon by the Party carrying out the explosion and by Designated Personnel.

11. Two individuals from the Party carrying out the explosion shall have the right to join Designated Personnel in the command and monitoring facility at the time of the explosion, to observe command and monitoring of the recording equipment and acquisition and duplication of data transmitted from each recording facility, and to receive a copy of the data. Designated Personnel, in the presence of personnel of the Party carrying out the explosion, shall recover all recordings of data taken at the time of the explosion and prepare two identical copies of such data. Personnel of the Party carrying out the explosion shall select one of the two identical copies by lot, and Designated Personnel shall retain the other copy. Designated Personnel shall retain no other such data, and shall have no further access to their recording facilities, their command and monitoring facility, and their equipment until these are returned to the Verifying Party, in accordance with paragraph 11 of Section VIII of this Protocol, unless the Parties otherwise agree, in which case access of the Designated Personnel to their recording facilities, their command and monitoring facility, and their equipment shall be under the observation of personnel of the Party carrying out the explosion. Designated Personnel shall provide the Party carrying out the explosion with information on sensor location in relation to the explosive canister. With respect to digital recording of signals, the Verifying Party shall provide a description of the recording format and a sample of the computer program for reading digital data. The program shall be provided by Designated Personnel upon their arrival at the point of entry.

12. Designated Personnel shall not be present in areas from which all personnel of the Party carrying out the explosion have been withdrawn in connection with carrying out an explosion, but shall have the right to reenter those areas at the same time as personnel of the Party carrying out the explosion.

SECTION VI. LOCAL SEISMIC NETWORK

1. For any group explosion that the Party carrying out the explosion has notified to have a planned aggregate yield exceeding 150 kilotons, and with respect to which the Verifying Party has notified its intention to measure the yield of the explosion using the hydrodynamic yield

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measurement method, Designated Personnel, in addition to using the hydrodynamic yield measurement method, shall have the right to install and use, under the observation and with the assistance of personnel of the Party carrying out the explosion if Designated Personnel request such assistance, a local seismic network.

2. Such a network shall be installed and used at locations agreed upon by the Parties within an area circumscribed by circles of 15 kilometer radius centered on points on the surface of the earth above the points of emplacement of the explosives. The number of stations of the network shall be determined by the Verifying Party, but shall not exceed the number of explosives in the group plus eight.

3. The control point of the local seismic network shall be installed at a location that the Parties agree is outside the areas specified in paragraph 12 of Section V of this Protocol and within the area specified in paragraph 2 of this Section, unless the Parties otherwise agree. Designated Personnel shall have the right to have access to their equipment in the control point at any time from commencement of installation of the local seismic network until five days following the explosion, subject to the provisions of paragraph 12 of Section V, if applicable, and paragraph 10(e) of Section VIII of this Protocol.

4. Installation of a local seismic network may commence 20 days prior to the planned date of the explosion, and its operation shall continue no more than three days following the explosion, unless the Parties otherwise agree.

5. Designated Personnel shall have the right to use radio communication for the transmission and reception of data and control signals between seismic stations and the control point of the local seismic network. Frequencies and maximum power output of radio transmitters, frequency range and sensitivity of radio receivers, orientation of transmitting and receiving antennas, and period of operation of the local seismic network radio transmitters and radio receivers prior to the explosion shall be agreed upon by the Parties. Operation of the radio equipment following the explosion shall continue for no more than three days, unless the Parties otherwise agree.

6. Designated Personnel shall have access along agreed routes to the stations and the control point of the local seismic network for the purpose of carrying out activities related to the installation and use of the local seismic network.

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7. In installing and using a local seismic network, Designated Personnel shall have the right to use and retain the topographic chart provided in accordance with paragraph 6(e) of Section IV of this Protocol.

8. Designated Personnel shall have the right to obtain photographs associated with the local seismic network, which shall be taken by the Party carrying out the explosion at the request of Designated Personnel in accordance with applicable provisions of paragraph 8 of Section V of this Protocol.

9. Within five days following the explosion, Designated Personnel shall provide the Party carrying out the explosion with the original and one copy of the data from the local seismic network stations recorded on the primary medium, graphic representation of recording materials on a paper medium, and the results of calibration of seismic channels. Upon receipt of these materials the Party carrying out the explosion, in the presence of Designated Personnel, shall select and retain either the copy or the original of each recording, graphic representation, and results of calibration of the seismic channels. The set of data not selected by the Party carrying out the explosion shall be retained by Designated Personnel. For digital recording of seismic signals, the Verifying Party shall provide the description of the recording format and a sample of the computer program for reading digital data. Designated Personnel shall provide the program sample upon arrival at the point of entry. Seismic recordings provided to the Party carrying out the explosion shall cover a time period beginning no less than 30 seconds prior to the time of arrival of the first explosion-generated P-wave at any station of the local seismic network and ending no more than three days after the explosion, unless the Parties otherwise agree. All seismic recordings shall include a common time reference agreed upon by the Parties.

SECTION VII. ON-SITE INSPECTION

1. In carrying out on-site inspection, the Verifying Party shall have the right to confirm the validity of the geological and geophysical information provided in accordance with paragraphs 3 and 7 of Section IV of this Protocol in accordance with the following procedures:

(a) Designated Personnel may analyze relevant studies and measurement data, including logging data, of the Party carrying out the explosion, the core

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samples or rock fragments extracted from each emplacement hole from the bottom of the hole to a distance above the point of emplacement in meters equal to 40 times the cube root of the planned yield in kilotons of the emplaced explosive, as well as any logging data and core samples from existing exploratory holes, which shall be provided to Designated Personnel upon their arrival at the explosion site, if the Party carrying out the explosion carried out relevant studies, measurements, and coring;

(b) Designated Personnel shall have the right to observe logging and the extraction of core samples or rock fragments from locations agreed upon by the Parties within the portion of the emplacement hole specified in subparagraph (a) of this paragraph or from an exploratory hole, provided that it is located no farther from the emplacement hole than a distance in meters equal to 10 times the cube root of the planned yield in kilotons of the emplaced explosive at depth intervals agreed upon by the Parties if such operations are carried out by the Party carrying out the explosion;

(c) Designated Personnel shall have the right to use their own equipment for logging the emplacement hole and extracting sidewall rock samples within the portion of the emplacement hole identified in subparagraph (a) of this paragraph. Such operations shall be conducted in the presence of personnel of the Party carrying out the explosion; and

(d) all logging data produced by either Party, including calibration data, shall be duplicated, and one copy of the data shall be provided to each Party. Calibration data shall include information needed to confirm the sensitivity of the equipment under the conditions in which it is used. Designated Personnel shall have the right to examine and remove from the territory of the Party carrying out the explosion core samples, sidewall rock samples, and rock fragments specified in subparagraphs (a), (b), and (c) of this paragraph, as selected by Designated Personnel.

2. In carrying out on-site inspection, Designated Personnel shall have the right:

(a) to confirm by direct measurement the validity of the information provided in accordance with paragraph 7(f) of Section IV of this Protocol;

(b) to confirm the validity of the information provided in accordance with paragraph 7(g) of Section

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IV of this Protocol, by observing relevant measurements being made, and by having access to the data obtained if such measurements are conducted by the Party carrying out the explosion, and by making measurements with their own equipment to determine the location and configuration of any voids within each hydrodynamic measurement zone;

(c) to have access to the site of the explosion and to facilities and structures related to the conduct of the explosion, along agreed routes;

(d) to observe the emplacement of each explosive canister, to confirm the depth of its emplacement and the relative location of explosives in a group, and to observe the stemming of each emplacement hole;

(e) to have access to their equipment associated with carrying out on-site inspection from commencement of its use by Designated Personnel at the explosion site until the departure of all personnel from the explosion area prior to the explosion;

(f) to unimpeded visual observation of the entrance area to each emplacement hole at any time from the moment of emplacement of each explosive until the departure of all personnel from the explosion area prior to the explosion; and

(g) to observe the explosion.

3. Designated Personnel shall have the right to obtain photographs associated with carrying out on-site inspection, which shall be taken by the Party carrying out the explosion at the request of Designated Personnel, in accordance with paragraphs 8 and 9 of Section V of this Protocol.

SECTION VIII. EQUIPMENT

1. Designated Personnel, in carrying out activities related to verification in accordance with this Protocol, shall have the right to bring into the territory of the Party carrying out the explosion, install, and use the following equipment:

(a) if the Verifying Party has provided notification of its intent to use the hydrodynamic yield measurement method, part or all of the equipment specified in paragraph 5 of this Section;

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(b) if the Verifying Party has provided notification of its intent to use a local seismic network, part or all of the equipment specified in paragraph 6 of this Section;

(c) if the Verifying Party has provided notification of its intent to carry out on-site inspection, part or all of the equipment specified in paragraph 7 of this Section;

(d) geologist's field tools and kits, geodetic equipment, topographic survey equipment, equipment for recording of field data, and equipment for rapid photo processing;

(e) portable short-range communication equipment, whose power and frequency shall conform to restrictions established by the Party carrying out the explosion;

(f) mobile work stations and temporary facilities;

(g) medical and health physics equipment and supplies, personal protective gear, personal computers, recreational and other items as may be agreed by the Parties; and

(h) satellite communications equipment, if the Party carrying out the explosion does not provide satellite communications for Designated Personnel.

2. At the choice of the Party carrying out the explosion, closed-circuit television equipment shall be provided by the Verifying Party or the Party carrying out the explosion, for the purpose of remote observation by the Verifying Party, in accordance with paragraph 6(e) of Section V of this Protocol.

3. Designated Personnel, in carrying out activities related to verification in accordance with this Protocol, shall have the right to bring into the territory of the Party carrying out the explosion, for use by the personnel of the Party carrying out the explosion in accordance with paragraph 8 of Section V of this Protocol, photographic cameras, film, and related photographic equipment.

4. No less than 120 days prior to the planned date of the beginning of emplacement of explosives, the Parties shall agree upon the list of such additional equipment as may be requested by the Verifying Party, and which shall be supplied by the Party carrying out the explosion for use by Designated Personnel. Such additional equipment

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with its description and operating instructions shall be provided to Designated Personnel upon arrival at the site of the explosion.

5. The complete list of equipment for hydrodynamic yield measurement shall include:

(a) sensing elements and associated cables for use in the emplacement hole;

(b) the recording facility or facilities, including equipment for sending and recording commands, equipment for generation of a timing reference signal from hydrodynamic measurement cables, and equipment for data acquisition, recording and processing, and, with respect to a group explosion in which any individual explosion in the group is separated from any other explosion by more than two kilometers, radio equipment for monitoring the operational status of the equipment and for transmitting and receiving control signals. Frequencies and maximum power output of radio transmitters, frequency range and sensitivity of radio receivers, and orientation of transmitting and receiving antennas shall be agreed upon by the Parties. Operation of the radio equipment shall begin at the time of the beginning of emplacement of sensing elements and associated cables and shall end at the time of the explosion. Designated Personnel shall notify the Party carrying out the explosion in advance of any activation or deactivation of the radio equipment;

(c) cables for above-ground transmission of electrical power, control signals and data;

(d) electrical power supplies;

(e) measuring and calibration instruments, support equipment, maintenance equipment, and spare parts necessary for ensuring the functioning of sensing elements, cables and equipment of the recording facilities and the command and monitoring facility;

(f) logging and sidewall rock sampling equipment necessary for confirming geological and geophysical characteristics of the emplacement hole as well as for obtaining data on the spatial location of points of emplacement of each explosive canister;

(g) coring equipment and drilling equipment for the drilling of an exploratory hole for coring

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purposes. Upon agreement between the Parties, the Verifying Party, under leasing conditions, may use for these purposes the coring and drilling equipment of the Party carrying out the explosion; and

(h) the command and monitoring facility, with equipment, including computers, for generating and recording command and monitoring signals, for transmitting and receiving command and monitoring signals between each recording facility and the command and monitoring facility, as well as for retrieving, storing, and processing hydrodynamic data.

6. The complete list of equipment for a local seismic network shall include:

(a) seismic stations, each of which contains seismic instruments, an electrical power supply and associated cables, and radio equipment for receiving and transmitting control signals and data;

(b) equipment for the control point, including electrical power supplies, equipment for sending and recording control signals and data, and data processing equipment; and

(c) measuring and calibration instruments, support equipment, maintenance equipment, and spare parts necessary for ensuring the functioning of the complete network.

7. The complete list of equipment for on-site inspection shall include logging and sidewall rock sampling equipment necessary for confirming geological and geophysical characteristics of the emplacement hole as well as for obtaining data on the spatial location of points of emplacement of each explosive canister.

8. The following procedures shall be followed with respect to the equipment for hydrodynamic yield measurement, the equipment for on-site inspection, and the equipment for a local seismic network:

(a) no less than 140 days prior to the planned date of the beginning of emplacement of explosives, the Verifying Party, if it has declared its intention to use the hydrodynamic yield measurement method, shall provide the Party carrying out the explosion with the equipment and information specified in subparagraph (a)(1) of this paragraph and, if the Verifying Party has declared its intention to use a local seismic network, the equipment and information

92

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specified in subparagraph (a)(ii) of this paragraph; or, if it has declared its intention to conduct on-site inspection, equipment and information specified in subparagraph (a)(iii) of this paragraph, in order to enable the Party carrying out the explosion to familiarize itself with such equipment, if such equipment and information have not previously been provided. If, upon completion of familiarization with the equipment provided in accordance with this subparagraph, the Party carrying out the explosion concludes that use of any element of the equipment provided would be inconsistent with its containment or security requirements, the Party carrying out the explosion shall promptly, but no less than 120 days prior to the planned date of the beginning of emplacement of explosives, so inform the Verifying Party, and shall specify the modifications that must be made in this equipment to satisfy the requirements of the Party carrying out the explosion. The equipment provided in accordance with this subparagraph shall be returned in the same condition as that in which it was received to the Verifying Party at the point of entry no less than 90 days prior to the planned date of the beginning of emplacement of explosives. The following equipment and information shall be provided:

(i) one set of equipment specified in paragraphs 5(a), 5(b), 5(c), 5(d), 5(e), 5(f) and 5(h) of this Section, as well as electrical and mechanical design information, specifications, and installation and operating instructions for this equipment;

(ii) one set of equipment specified in paragraph 6 of this Section, including one seismic station, as well as electrical and mechanical design information, specifications, and installation and operating instructions for this equipment; and

(iii) one set of equipment specified in paragraph 7 of this Section, as well as electrical and mechanical design information, specifications, and operating instructions for this equipment;

(b) no less than 50 days prior to the planned date of the beginning of emplacement of explosives, the Verifying Party shall deliver in sealed containers, to the point of entry in the territory of the Party carrying out the explosion, two identical sets of each type of equipment that it intends to use

49

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for activities related to verification for that explosion, with a complete inventory of equipment, specifying any components that do not perform functions directly related to measurements during the explosion. These sets of equipment shall have the same components and technical characteristics as the equipment specified in subparagraph (a) of this paragraph, or, if specified by the Party carrying out the explosion in accordance with subparagraph (a) of this paragraph, shall contain modifications made in accordance with the requirements of the Party carrying out the explosion with regard to containment and security. Each of the two identical sets shall include the following:

(i) if the Verifying Party has provided notification of its intent to use the hydrodynamic yield measurement method, equipment specified in paragraphs 5(a), 5(b), and 5(h) of this Section; and

(ii) if the Verifying Party has provided notification of its intent to use a local seismic network, equipment specified in paragraphs 6(a) and 6(b) of this Section;

(c) the Party carrying out the explosion shall choose one of the two identical sets of each type of equipment for use by Designated Personnel;

(d) at the point of entry the Party carrying out the explosion shall affix its own seals to the sealed containers in which the equipment chosen for use arrived, shall ensure protection of this equipment throughout the entire period it is in the territory of the Party carrying out the explosion, and shall transport that equipment to the site of the explosion. Prior to shipment to the site of the explosion, the set of equipment chosen for use shall be kept sealed at the point of entry, and the time of its shipment to the site of the explosion shall be determined by the Party carrying out the explosion. The Party carrying out the explosion shall consult with Designated Personnel regarding plans and schedule of shipment of the equipment no less than 48 hours in advance of the shipment. Designated Personnel shall have the right to unimpeded verification of the integrity of their seals, to observe their equipment, and to accompany their equipment. This equipment shall be handed over to Designated Personnel at the site of the explosion for emplacement, installation, and use no less than 20 days prior to the planned date of the beginning of

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emplacement of explosives, and it shall thereafter remain under the control of Designated Personnel; seals affixed to the equipment specified in paragraph 5(a) of this Section shall not be removed prior to preparation for installation of such equipment, at which time the seals shall be removed by Designated Personnel in the presence of personnel of the Party carrying out the explosion, and personnel of the Party carrying out the explosion thereafter shall have the right to observe all activities relating to the installation of such equipment;

(e) seals of the Verifying Party shall be removed from equipment not chosen for use, in the presence of personnel of both Parties, and thereafter this equipment shall be retained for inspection by the Party carrying out the explosion without the presence of Designated Personnel for a period ending no more than 30 days following the explosion, at which time such equipment shall be returned in the same condition as that in which it was received to the Verifying Party at the point of entry;

(f) no less than 50 days prior to the planned date of the beginning of emplacement of explosives, the Verifying Party shall provide, at its option, either one or two sets of the equipment that the Verifying Party intends to use for activities related to verification for this explosion, other than equipment specified in paragraph 8(b) of this Section. A complete inventory of such equipment, specifying any components that do not perform functions directly related to measurements during the explosion, shall be provided to the Party carrying out the explosion at least one week prior to the planned arrival of the equipment at the point of entry. If only one set of equipment is provided by the Verifying Party, the Party carrying out the explosion shall have the right to inspect this equipment upon its arrival at the point of entry for up to 30 days, without the presence of Designated Personnel. Upon conclusion of the inspection, the Party carrying out the explosion shall identify any equipment that it deems unacceptable for delivery to the site of the explosion, in which case such equipment shall be removed by the Verifying Party and returned to its territory. All equipment deemed acceptable for delivery to the site of the explosion shall be shipped to the site of the explosion so as to enable Designated Personnel to carry out their activities related to verification as set forth in the coordinated schedule specified in paragraph 6 of Section XI of this Protocol, but in no case less than

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20 days prior to the beginning of emplacement of explosives. The Party carrying out the explosion shall transport this equipment in such a manner as to ensure that it is delivered to Designated Personnel in the same condition as that in which it was received. If two sets of equipment are provided by the Verifying Party, the procedures specified in paragraphs 8(b), 8(c), 8(d), and 8(e) of this Section for selection and inspection of equipment shall be followed. If the Verifying Party under leasing conditions uses coring and drilling equipment of the Party carrying out the explosion, such equipment shall be provided to Designated Personnel at the site of the explosion so as to enable Designated Personnel to carry out their activities related to verification as set forth in the coordinated schedule referred to in paragraph 6 of Section XI of this Protocol, but in no case less than 20 days prior to the beginning of emplacement of explosives, unless the Parties otherwise agree;

(g) with respect to the equipment specified in paragraphs 5(a) and 5(c) of this Section, the Party carrying out the explosion shall have the right to retain for its own purposes up to 150 meters of each type of cable in the set being inspected. The cable segments to be retained may be taken from any place along the length of the cable, but the number of individual segments shall not exceed the number of reels of cable in a set of equipment; and

(h) after inspecting the equipment in accordance with paragraphs 8(e) and 8(f) of this Section, the Party carrying out the explosion shall inform Designated Personnel what equipment of that delivered to the site of the explosion it deems unacceptable for use during the explosion.

9. Prior to the beginning of emplacement of explosives, Designated Personnel shall certify in writing to the personnel of the Party carrying out the explosion that the equipment delivered to the site of the explosion is in working condition.

10. Personnel of the Party carrying out the explosion shall have the right to observe use of equipment by Designated Personnel at the site of the explosion, with access to the recording facilities, the command and monitoring facility, the control point, and seismic stations of the local seismic network of the Verifying Party being subject to the following:

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(a) at any time prior to the explosion that Designated Personnel are not present in the recording facilities, in the command and monitoring facility, in the control point, or at the seismic stations, these facilities, control point, and stations shall be sealed by the seals of both Parties. Seals may be removed by Designated Personnel only in the presence of personnel of the Party carrying out the explosion;

(b) prior to the explosion, personnel of the Party carrying out the explosion may enter the recording facilities, the command and monitoring facility, or the control point of the Verifying Party for the purpose of conducting operations that require the participation of both Parties only with the agreement of the Designated Personnel Team Leader and when accompanied by the Designated Personnel Team Leader or his designated representative;

(c) at all other times prior to the explosion, personnel of the Party carrying out the explosion may enter the recording facilities, the command and monitoring facility, or the control point of the Verifying Party only at the express invitation of the Designated Personnel Team Leader and when accompanied by the Designated Personnel Team Leader or his designated representative;

(d) following the explosion, Designated Personnel shall have the right to enter the recording facilities for data recovery only when accompanied by personnel of the Party carrying out the explosion. No later than the final dry run, Designated Personnel shall inform the Party carrying out the explosion of procedures for recovering such data and shall advise the Party carrying out the explosion at the time of data recovery of any changes the Designated Personnel make in those procedures and the reasons for such changes. Personnel of the Party carrying out the explosion shall observe the process of data recovery from instrumentation in the recording facilities and the command and monitoring facility, and shall leave the recording facilities and the command and monitoring facility at the same time as Designated Personnel; and

(e) at any time following the explosion, personnel of the Party carrying out the explosion shall have the right to observe the activities of Designated Personnel in the control point. Personnel of the Party carrying out the explosion shall be present in the control point to observe recovery of the initial data, which shall take place within one

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hour following the explosion. At any time following the explosion that Designated Personnel are not present in the control point, the control point shall be sealed with the seals of both Parties. The seals may be removed by Designated Personnel only in the presence of personnel of the Party carrying out the explosion. Within five days following the explosion, Designated Personnel shall leave the control point at the same time as personnel of the Party carrying out the explosion.

11. Following data recovery, the equipment used for activities related to verification in accordance with this Protocol may be retained by the Party carrying out the explosion and be subject to its exclusive control for a period ending no more than 30 days following data recovery, at which time this equipment shall be returned, in the same condition as that in which it was received, to the Verifying Party at the point of entry. Elimination of information stored in memories shall not be deemed damage to the equipment.

SECTION IX. DESIGNATED PERSONNEL AND TRANSPORT PERSONNEL

1. No later than 10 days following entry into force of the Treaty, each Party shall provide the other Party with a list of its proposed Designated Personnel who will carry out the activities related to verification in accordance with this Protocol and a list of its proposed Transport Personnel who will provide transportation for these Designated Personnel, their baggage, and equipment of the Verifying Party. These lists shall contain name, date of birth, and sex of each individual of its proposed Designated Personnel and Transport Personnel. The list of Designated Personnel shall at no time include more than 200 individuals, and the list of Transport Personnel shall at no time include more than 200 individuals.

2. Each Party shall review the list of Designated Personnel and the list of Transport Personnel proposed by the other Party. If the Party reviewing a list determines that an individual included thereon is acceptable to it, it shall so inform the Party providing the list within 20 days following receipt of the list, and such an individual shall be deemed accepted. If the Party reviewing a list determines that an individual included thereon is not acceptable to it, it shall so inform the Party providing the list of its objection within 20 days following receipt of the list, and such an individual shall be deemed not accepted and shall be deleted from the list.

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3. Each Party may propose the addition or substitution of individuals on its list of Designated Personnel or its list of Transport Personnel at any time, who shall be designated in the same manner as is provided for in paragraph 2 of this Section with regard to the initial lists. Annually, no more than 40 individuals from the list of Designated Personnel shall be subject to substitution. This limitation shall not apply to the replacement of individuals due to permanent physical incapacity or death, or to deletion of an individual from the list of Designated Personnel in accordance with paragraph 5 of this Section. Replacement of an individual due to permanent physical incapacity, death or deletion from the list shall be accomplished in the same manner as is provided for in paragraph 2 of this Section.

4. Following receipt of the initial list of Designated Personnel or the initial list of Transport Personnel or of subsequent changes thereto, the Party receiving such information shall prepare for the issuance of such visas and other documents as may be required to ensure that each individual on the list of Designated Personnel or the list of Transport Personnel to whom it has agreed may enter and remain in its territory for the purpose of carrying out activities related to verification in accordance with this Protocol. Such visas and documents shall be provided by the Party carrying out the explosion only to the individuals whose names are included on the lists provided by the Verifying Party, in accordance with paragraph 3 of Section X of this Protocol, upon receipt of such lists. Such visas and documents shall be valid for multiple entry throughout the period of preparation and conduct of the particular explosion.

5. If a Party determines that an individual included on the list of Designated Personnel or the list of Transport Personnel of the other Party has violated the provisions of this Protocol or has ever committed a criminal offense in its territory, or has ever been sentenced for committing a criminal offense, or has ever been expelled from its territory, the Party making such a determination shall so notify the other Party of its objection to the continued inclusion of this individual on the list. If at that time this individual is present in the territory of the Party raising the objection, the other Party shall immediately recall this individual from the territory of the Party raising this objection and immediately thereafter delete that individual from the list of Designated Personnel or from the list of Transport Personnel.

6. Designated Personnel with their personal baggage and equipment of the Verifying Party shall be permitted to

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enter the territory of the Party carrying out the explosion at the designated point of entry, to remain in that territory and to exit through the designated point of entry.

7. Designated Personnel and Transport Personnel shall be accorded the following privileges and immunities for the entire period they are in the territory of the Party carrying out the explosion and thereafter with respect to acts previously performed in the exercise of their official functions as Designated Personnel or Transport Personnel:

(a) Designated Personnel and Transport Personnel shall be accorded the inviolability enjoyed by diplomatic agents pursuant to Article 29 of the Vienna Convention on Diplomatic Relations of April 18, 1961;

(b) living and working quarters occupied by Designated Personnel and Transport Personnel carrying out activities in accordance with this Protocol shall be accorded the inviolability and protection accorded the quarters of missions and diplomatic agents pursuant to Articles 22 and 30 of the Vienna Convention on Diplomatic Relations;

(c) archives, documents, papers and correspondence of Designated Personnel and Transport Personnel shall enjoy the inviolability accorded the archives, documents, papers and correspondence of missions and diplomatic agents pursuant to Articles 24 and 30 of the Vienna Convention on Diplomatic Relations. In addition, the aircraft or other transport vehicles of the Verifying Party shall be inviolable;

(d) Designated Personnel and Transport Personnel shall be accorded the immunities accorded diplomatic agents pursuant to paragraphs 1, 2, and 3 of Article 31 of the Vienna Convention on Diplomatic Relations. Immunity from jurisdiction of Designated Personnel or Transport Personnel may be waived by the Verifying Party in those cases in which it is of the opinion that immunity would impede the course of justice and it can be waived without prejudice to the implementation of the provisions of this Protocol. Waiver must always be express;

(e) Designated Personnel and Transport Personnel carrying out their activities in accordance with this Protocol shall be accorded the exemption from dues and taxes accorded diplomatic agents

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pursuant to Article 34 of the Vienna Convention on Diplomatic Relations;

(f) living and working quarters occupied by Designated Personnel and Transport Personnel carrying out their activities in accordance with this Protocol shall be accorded the exemption from dues and taxes accorded mission premises pursuant to Article 23 of the Vienna Convention on Diplomatic Relations; and

(g) Designated Personnel and Transport Personnel shall be permitted to bring into the territory of the Party carrying out the explosion, without payment of any customs duties or related charges, articles for their personal use, with the exception of articles the import or export of which is prohibited by law or controlled by quarantine regulations.

8. Designated Personnel and Transport Personnel shall not engage in any professional or commercial activity for personal profit in the territory of the Party carrying out the explosion.

9. Without prejudice to their privileges and immunities, Designated Personnel and Transport Personnel shall be obliged to respect the laws and regulations of the Party carrying out the explosion and shall be obliged not to interfere in the internal affairs of that Party.

10. If the Party carrying out the explosion considers that there has been an abuse of privileges and immunities specified in paragraph 7 of this Section, consultations shall be held between the Parties to determine whether such an abuse has occurred and, if so determined, to prevent a repetition of such an abuse.

SECTION X. ENTRY, TRANSPORT, FOOD, LODGING AND PROVISION OF SERVICES FOR DESIGNATED PERSONNEL AND TRANSPORT PERSONNEL

1. The Party carrying out the explosion shall ensure Designated Personnel and Transport Personnel access to its territory for the purposes of carrying out activities related to verification, in accordance with this Protocol, and shall provide these personnel with such other assistance as may be necessary to enable them to carry out these activities. Following notification by the Verifying Party of its intention to conduct hydrodynamic yield

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measurement or to carry out on-site inspection, Designated Personnel shall have the right to be present at the site of the explosion to carry out activities in accordance with this Protocol at such times and for such periods as required to carry out these activities. The specific times and periods for carrying out such activities shall be specified in the coordinated schedule specified in paragraph 6 of Section XI of this Protocol.

2. The number of Designated Personnel shall not exceed:

(a) when exercising their rights and functions associated with drilling, logging, hole surveying, and coring, if this work is carried out by Designated Personnel operating their own equipment or equipment leased from the Party carrying out the explosion, 25;

(b) when exercising their rights and functions associated with observing drilling, logging, hole surveying, and coring performed by the Party carrying out the explosion, or when Designated Personnel perform logging, hole surveying, or sidewall rock sampling, 10;

(c) when exercising their rights and functions associated with the confirmation of the validity of geological and geophysical information, the number of emplacement holes plus three;

(d) when exercising their rights and functions associated with the use of hydrodynamic yield measurement equipment, the number of explosives plus three, plus the number of recording facilities specified in paragraph 5 of Section VIII of this Protocol multiplied by seven; and, with respect to group explosions in which radio controlled recording facilities are employed, three per recording facility, plus seven for the command and monitoring facility;

(e) when exercising their rights and functions associated with the use of a local seismic network, 15;

(f) for administrative, coordination, clerical, and health and safety matters, when Designated Personnel described in subparagraphs (a), (b), (c), (d), and (e) of this paragraph are present, eight; and

(g) if the Verifying Party provides food and housing for Designated Personnel identified in subparagraphs (a), (b), (c), (d), (e), and (f) of this paragraph, six.

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3. No less than 20 days prior to the planned arrival of its Designated Personnel or equipment at the point of entry to carry out activities related to verification of a particular explosion, the Verifying Party shall provide the Party carrying out the explosion with:

(a) a list of the names of the Designated Personnel, their passports and documentation, and a list of the names of the Transport Personnel, their passports and documentation, who will carry out activities related to verification of a particular explosion;

(b) the names of the Designated Personnel Team Leader and deputy team leader, and the names of those individuals from the Designated Personnel who will escort equipment of the Verifying Party to the site of the explosion;

(c) confirmation of the point of entry to be used;

(d) the scheduled date and the estimated time of arrival of Designated Personnel at the point of entry; and

(e) designation of the mode of transport to be used.

No more than 15 days following receipt of the lists, passports, and documentation specified in subparagraph (a) of this paragraph, the Party carrying out the explosion shall return those passports to the Verifying Party with the visas and documents specified in paragraph 4 of Section IX of this Protocol.

4. If a transport aircraft other than a regularly scheduled commercial aircraft is used for transportation, its flight path shall be along airways that are agreed upon by the Parties, and its flight plan shall be filed in accordance with the procedures of the International Civil Aviation Organization applicable to civil aircraft, including in the remarks section of the flight plan a confirmation that the appropriate clearance has been obtained. The Party carrying out the explosion shall provide parking, security protection, servicing, and fuel for the aircraft of the Verifying Party at the point of entry. The Verifying Party shall bear the cost of such fuel and servicing.

5. The Party carrying out the explosion shall ensure that any necessary clearances or approvals are granted so as to enable Designated Personnel, their baggage, and

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equipment of the Verifying Party to arrive at the point of entry by the estimated arrival date and time.

6. The Party carrying out the explosion shall assist Designated Personnel and Transport Personnel and their baggage in passage through customs without undue delay. The Party carrying out the explosion shall provide transportation between the point of entry and the site of the explosion for Designated Personnel, for their baggage and equipment of the Verifying Party, so as to enable such personnel to exercise their rights and functions in the time periods provided for in this Protocol.

7. The Party carrying out the explosion shall have the right to assign its personnel to escort Designated Personnel and Transport Personnel while they are in the territory of the Party carrying out the explosion.

8. Except as otherwise provided for in this Protocol, movement and travel of Designated Personnel and Transport Personnel shall be subject to the authorization of the Party carrying out the explosion.

9. During the period Designated Personnel and Transport Personnel are in the territory of the Party carrying out the explosion, the Party carrying out the explosion shall provide food, living and working facilities, secure places for storing equipment, transportation, and medical services for such personnel. If the Verifying Party desires to provide its own food or housing units for its Designated Personnel, or food for its Transport Personnel during their stay in the territory of the Party carrying out the explosion, the Party carrying out the explosion shall provide such assistance as may be necessary for such food and housing units to arrive at the appropriate locations. If the Verifying Party provides its own housing units, they shall be delivered to the point of entry no less than 30 days prior to the arrival of Designated Personnel. The Party carrying out the explosion shall have the right to inspect these housing units upon their arrival at the point of entry for a 30-day period, without the presence of personnel of the Verifying Party.

10. The Party carrying out the explosion shall ensure the Designated Personnel Team Leader or his designated representative access at all times to means of direct communications between the site of the explosion and the embassy of the Verifying Party, and shall provide Designated Personnel with telephone communications between their working facilities and living accommodations at the site of the explosion. The Designated Personnel Team Leader or his designated representative shall also have

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the right to use at all times satellite communications to ensure communications via the International Maritime Satellite Organization (INMARSAT) commercial satellite system, or a system of equivalent performance, between the site of the explosion and the telephone communications system of the Verifying Party. If the Party carrying out the explosion does not provide such communications, Designated Personnel shall have the right to use their own equipment specified in paragraph 1(h) of Section VIII of this Protocol. In this case, installation and alignment of all such equipment shall be done jointly. All equipment of this system, except the remote control unit, shall be locked and placed under seals of both Parties, and neither Party shall have access to this equipment except under the observation of personnel of the other Party. Designated Personnel shall have exclusive use of the remote control unit. If the Verifying Party provides satellite communications equipment, personnel of the Party carrying out the explosion shall have the right, under the observation of Designated Personnel, to make the following modifications provided they do not degrade the quality of communications:

(a) install bandpass filters, to limit the frequency range, in the antenna signal transmission and reception lines;

(b) modify the remote control unit to prevent manual tuning; and

(c) modify the satellite communications equipment to allow the Party carrying out the explosion to monitor all transmissions.

11. At the site of the explosion, Designated Personnel shall observe all safety rules and regulations applicable to the personnel of the Party carrying out the explosion, as well as those additional restrictions with regard to access and movement as may be established by the Party carrying out the explosion. Designated Personnel shall have access only to the areas where they will directly exercise their rights and functions in accordance with Sections V, VI, and VII of this Protocol.

12. Designated Personnel shall not be given or seek access by physical, visual or technical means to the interior of the explosive canister, to documentary or other information descriptive of the design of an explosive, or to equipment for control and firing of explosives. The Party carrying out the explosion shall not locate documentary or other information descriptive of the design of an explosive in such ways as to impede Designated Personnel in carrying out their activities in accordance with this Protocol.

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13. With the exception of those cases in which the Parties otherwise agree, all costs related to the activities of Designated Personnel and Transport Personnel carried out in accordance with this Protocol shall be borne by the Verifying Party, including costs for materials, equipment, leased equipment, and services that have been requested by and provided to the Verifying Party, as well as costs for transportation, food, living and working facilities, provision of medical assistance, and communications. These costs shall be billed at the standard or official rates existing in the territory of the Party carrying out the explosion.

14. The Verifying Party shall have the right to include among its Designated Personnel a medical specialist, who shall be allowed to bring medications, medical instruments, and portable medical equipment agreed upon by the Parties. If Designated Personnel are treated in a medical facility of the Party carrying out the explosion the medical specialist shall have the right to consult on the recommended treatment and monitor the course of medical treatment at all times. The medical specialist of the Verifying Party shall have the right to require the Party carrying out the explosion to provide emergency evacuation of any individual of Designated Personnel who is ill or suffered an accident to a mutually agreed medical facility in the territory of the Party carrying out the explosion or to the point of entry for emergency medical evacuation by the Verifying Party. Designated Personnel shall have the right to refuse any treatment prescribed by medical personnel of the Party carrying out the explosion, and in this case the Party carrying out the explosion shall not be responsible for any consequences of such refusal. Such refusal must always be express.

SECTION XI. PROCEDURES FOR CONSULTATION AND COORDINATION

1. To facilitate the implementation of this Protocol, the Parties shall use the Joint Consultative Commission, as provided for in the Treaty, that shall meet at the request of either Party. For each explosion for which activities are carried out in accordance with this Protocol, the Parties shall establish a Coordinating Group of this Commission.

2. The Coordinating Group shall be responsible for coordinating the activities of the Verifying Party with the activities of the Party carrying out the explosion.

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3. The Coordinating Group shall operate throughout the entire period of preparing and carrying out of the activities related to verification for a particular explosion, until the departure of Designated Personnel from the territory of the Party carrying out the explosion.

4. The Representative of the Verifying Party to the Coordinating Group shall be the Designated Personnel Team Leader, whose name shall be provided simultaneously with the notification of intent to carry out activities related to verification for a particular explosion. All members of the Coordinating Group from the Verifying Party shall be drawn from the list of Designated Personnel. Within 15 days following receipt of this notification, the Party carrying out the explosion shall provide the Verifying Party with the name of its Representative to the Coordinating Group.

5. The first meeting of the Coordinating Group shall be convened in the capital of the Party carrying out the explosion within 25 days following notification by the Verifying Party of its intent to conduct activities related to verification for a particular explosion. Thereafter, the Coordinating Group shall meet at the request of either Party.

6. At the first meeting of the Coordinating Group, the Party carrying out the explosion shall present a list, including times and durations, of all its planned activities that are to be carried out as from the first day of this meeting and affect the rights of the Verifying Party provided in this Protocol. The Verifying Party shall provide a preliminary statement of its requirements for technical and logistical support for the activities related to verification that it intends to carry out. Within 10 days the Parties shall develop and agree upon a coordinated schedule, including specific times and durations for carrying out activities related to verification, that shall ensure the rights of each Party provided in this Protocol.

7. Agreement of the Representative of each Party in the Coordinating Group shall constitute agreement of the Parties with respect to the following specific provisions of this Protocol:

(a) Section I: paragraph 5;

(b) Section IV: paragraphs 9, 10(b), and 11;

(c) Section V: paragraphs 2, 3, 4(b), 6(a), 7, 8(d), 9(f), 10, and 11;

99

- (d) Section VI: paragraphs 2, 3, 4, 5, 6, and 9;
- (e) Section VII: paragraphs 1(b) and 2(c);
- (f) Section VIII: paragraphs 1(g), 4, 5(b), 5(g), and 8(f);
- (g) Section X: paragraphs 4 and 13; and
- (h) Section XI: paragraph 6.

8. Upon completion of activities related to verification at the site of an explosion, the Designated Personnel Team Leader shall prepare, at his option, either at the site of the explosion or in the capital of the Party carrying out the explosion, a report of the activities provided for in this Protocol that were carried out by Designated Personnel. The report shall be factual, and shall list the types of activities in chronological order. Lists of information, of photographs, and of data required in accordance with this Protocol and provided by Designated Personnel to the Party carrying out the explosion and received by Designated Personnel from the Party carrying out the explosion in the course of conducting activities related to verification on the territory of the Party carrying out the explosion shall be appended to the report. The report shall be provided to the Party carrying out the explosion in its capital by the Designated Personnel Team Leader within 15 days following completion of activities related to verification at the site of the explosion.

9. If, in the course of implementing activities related to verification in accordance with this Protocol, questions arise requiring prompt resolution, such questions shall be considered by the Coordinating Group. If the Coordinating Group is unable to resolve such questions, they shall immediately be referred to the Joint Consultative Commission for resolution.

10. Within 30 days after the Party carrying out the explosion provides notification of its intent to carry out a group explosion having a planned aggregate yield exceeding 150 kilotons, a meeting of the Joint Consultative Commission shall be convened at the request of either Party with the goal of reaching agreement on specific procedures as specified in paragraph 2 of Section II of this Protocol. The explosion shall be conducted no less than 150 days following agreement of the Parties upon such procedures.

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11. The Joint Consultative Commission may, as necessary, establish and amend procedures governing the activities of the Coordinating Group.

SECTION XII. RELEASE OF INFORMATION

1. Nothing in the Treaty and this Protocol shall affect the proprietary rights of either Party in information provided by it in accordance with the Treaty and this Protocol, or in information that may be disclosed to the other Party or that may become known to the other Party in preparing for, or carrying out, explosions. Claims to such proprietary rights, however, shall not impede implementation of the provisions of the Treaty and this Protocol.

2. Public release of the information provided in accordance with this Protocol or publication of material using such information may take place only with the agreement of the Party carrying out an explosion. Public release of the results of observation or measurements made by Designated Personnel may take place only with the agreement of both Parties.

SECTION XIII. ENTRY INTO FORCE

This Protocol is an integral part of the Treaty. It shall enter into force on the date of entry into force of the Treaty and shall remain in force as long as the Treaty remains in force.

DONE at Washington, in duplicate, this first day of June, 1990, in the English and Russian languages, both texts being equally authentic.

FOR THE UNITED STATES
OF AMERICA:

FOR THE UNION OF SOVIET
SOCIALIST REPUBLICS:

President of the United
States of America

President of the Union of
Soviet Socialist Republics

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CONFERENCE ON DISARMAMENT

CD/1068
8 March 1991

ENGLISH
Original: RUSSIAN

LETTER DATED 28 FEBRUARY 1991 FROM THE REPRESENTATIVE OF
THE UNION OF SOVIET SOCIALIST REPUBLICS ADDRESSED TO THE
PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING
THE TEXT OF THE 1974 TREATY BETWEEN THE UNION OF SOVIET
SOCIALIST REPUBLICS AND THE UNITED STATES OF AMERICA
ON THE LIMITATION OF UNDERGROUND NUCLEAR WEAPON TESTS,
TOGETHER WITH THE PROTOCOL THERETO */

I have the honour to forward to you the 1974 Treaty between the Union of Soviet Socialist Republics and the United States of America on the Limitation of Underground Nuclear Weapon Tests, together with the Protocol thereto, which entered into force following the exchange on instruments of ratification on 11 December 1990.

In accordance with past practice, the representative of the United States at the Conference on Disarmament, Ambassador S. Ledogar, will transmit these documents to the Conference on Disarmament in English.

Please take the appropriate steps to issue the text of this Treaty and the Protocol as official documents of the Conference on Disarmament, and to distribute them to the delegations of all member States of the Conference and non-member States of the Conference which are participating in the Conference's work.

(Signed)

S. BATSANOV

Representative of the USSR at
the Conference on Disarmament

*/ The official English text of the above-mentioned Treaty together with the Protocol thereto is to be found in CD/1066.

TEXT OF TREATY NOT REPRODUCED HERE

SEE CD/1066

CONFERENCE ON DISARMAMENT

CD/1069
8 March 1991

ENGLISH
Original: RUSSIAN

LETTER DATED 28 FEBRUARY 1991 FROM THE REPRESENTATIVE OF THE UNION OF SOVIET SOCIALIST REPUBLICS ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF THE 1976 TREATY BETWEEN THE UNION OF SOVIET SOCIALIST REPUBLICS AND THE UNITED STATES OF AMERICA ON UNDERGROUND NUCLEAR EXPLOSIONS FOR PEACEFUL PURPOSES, TOGETHER WITH THE PROTOCOL THERETO */

I have the honour to forward to you the 1976 Treaty between the Union of Soviet Socialist Republics and the United States of America on Underground Nuclear Explosions for Peaceful Purposes, together with the Protocol thereto, which entered into force following the exchange on instruments of ratification on 11 December 1990.

In accordance with past practice, the representative of the United States at the Conference on Disarmament, Ambassador S. Ledogar, will transmit these documents to the Conference on Disarmament in English.

Please take the appropriate steps to issue the text of this Treaty and the Protocol as official documents of the Conference on Disarmament, and to distribute them to the delegations of all member States of the Conference and non-member States of the Conference which are participating in the Conference's work.

(Signed)

S. BATSANOV

Representative of the USSR at
the Conference on Disarmament

*/ The official English text of the above-mentioned Treaty together with the Protocol thereto is to be found in CD/1067.

TEXT OF TREATY NOT REPRODUCED HERE

SEE CD/1067

AUSTRALIA AND NEW ZEALAND

VERIFICATION OF A COMPREHENSIVE TEST BAN

Summary

New Zealand and Australia share a common commitment to the achievement of a comprehensive ban on nuclear testing. The resolution submitted jointly by Australia and New Zealand to last year's General Assembly emphasises that:

"An end to nuclear testing by all states in all environments for all time is an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation, and to contribute, along with other concurrent efforts to reduce nuclear arms, to the eventual elimination of nuclear weapons".

2 Despite overwhelming endorsement in the United Nations of the call for the early achievement of a CTB, there has been little substantive progress towards this goal. New Zealand and Australia share the sense of frustration felt by many countries that the major achievements of recent years in disarmament and arms control have not been matched by comparable progress on a nuclear test ban. The two countries saw the Partial Test Ban Treaty Amendment Conference as a good opportunity to discuss in depth ways of furthering the objective of a CTBT, particularly on the important issue of verification. This paper was originally submitted jointly to the Conference as a positive and constructive contribution to its discussions.

3 The achievement of an effective CTBT is of course a global concern, and the need for verification clearly is not confined to the existing nuclear weapons states. New Zealand and Australia firmly believe that a CTBT has an essential role in preventing the horizontal and vertical proliferation of nuclear weapons. The achievement of a verifiable nuclear test ban would considerably strengthen the non-proliferation regime based on the NPT, IAEA safeguards and nuclear free zones.

Verification Requirements

4 One fundamental argument that has been put forward against a CTBT is that a nuclear test ban would not be verifiable. The Governments of Australia and New Zealand do not accept this view. Substantial scientific evidence is now available establishing the feasibility of verifying a nuclear test ban, particularly through seismic monitoring. It is technically possible to detect underground nuclear tests with a high degree of confidence down to very low levels.

5 In the view of New Zealand and Australia the development of an effective verification mechanism is an important part of the process of creating an effective, widely supported, and verifiable CTBT. Effective verification is however only part of the whole process which will need to involve a political will on the part of a number of key players before it can be achieved. In the meantime we see great value in taking as far as we can the development of an effective verification mechanism.

Seismic Verification Techniques

6 The two countries consider that the work carried out within the Conference on Disarmament by the ad hoc Group of Scientific Experts (GSE) is of fundamental importance in demonstrating that technical means exist for the verification of a CTBT.

7 The first report of the ad hoc group in 1978 (CCD/558) presented the results of a study of the detection ability of a hypothetical global network (Network III (SRO)) of digital broad-band seismographs located at then existing seismograph stations. It was estimated that this network (of at least two sections) would have a 90 per cent chance of detecting an event of magnitude 3.8 to 4.2 (or greater) in the northern hemisphere and magnitude 4.0 to 4.6 (or greater) in the southern hemisphere. Magnitude 4.0 corresponds to an explosion of less than ten kilotons in most geological environments and much less than this level in some environments.

8 The third report of the group (CD/448) in 1984 pointed to significant developments in seismic instrumentation, including the installation of more seismic arrays. Since that date, there have been still greater improvements, particularly in response to the initiatives of the ad hoc group. While further study is needed to evaluate accurately the capability of the present global network, it is clearly very close to that projected in 1978, and may well be significantly better.

GSETT-2

9 New Zealand and Australia both strongly support, and are participating in, the second technical test on the global exchange and analysis of seismic data being conducted by the group (GSETT-2). Phase 3 of this test involving world wide data exchanges for a period of 42 consecutive days has just concluded. The two countries have contributed data from monitoring stations in Australia and New Zealand, and also from stations as far apart as the Cook Islands and Antarctica. All together, this seismic monitoring system covers a major part of the southern hemisphere, and represents an essential component in the global scope of the experiment.

10 Detailed evaluation of the test, which will take place in Phase 4 and be presented in the group's report, will be needed to assess the extent to which global seismicity has been monitored. However, it is already clear that from an operational point of view the test has been very successful. Modern communications systems have provided efficient means of data transmission from stations to international centres. At these centres, large computing facilities accomplished the huge task of assembling the mass of data pouring in from the network, and daily bulletins incorporating such data have generally been available within seven days. Requests from individual states for data to assist their national verification studies were responded to promptly by the centres. It is clear that the global system established for GSETT could well provide the basis for an effective system under a comprehensive test ban treaty.

11 Both New Zealand and Australia have recently upgraded their seismic monitoring and data transmission equipment as a further part of their contribution to GSETT-2. Australia acted as one of the four international data centres for this experiment. The seismic arrays operated by Australia have the facility for enhancing weak signals by data processing techniques, which makes a major contribution to the global network's detection ability, particularly in the southern hemisphere.

12 The two countries were well placed to contribute to the experiment because of their extensive experience in using seismic detection to monitor nuclear tests. Both New Zealand and Australia have for many years been closely monitoring France's nuclear testing programme at Mururoa Atoll in the South Pacific. Scientists in New Zealand and Australia have accordingly developed considerable practical expertise in the seismic monitoring of underground nuclear tests of varying magnitude.

13 New Zealand's monitoring of explosions in French Polynesia, using a seismograph station in the Cook Islands, has demonstrated the particular sensitivity of such stations to tests in oceanic areas. This would be an important factor in a global monitoring network.

14 Based on this collective experience, it is the considered view of the Australian and New Zealand Governments that seismic monitoring offers a reliable means of verifying a CTBT. The successful conclusion of GSETT-2 will further strengthen confidence in the effectiveness of a global seismic monitoring and data transmission system down to a very low level.

Evasion

15 The possibility of evasion has been put forward as a reason to doubt that a CTBT could be adequately monitored. Various technical scenarios have been put forward for ways in which countries might evade detection, primarily through 'decoupled' explosions in underground cavities. However, the technology to attempt such evasion is unlikely to be available outside the existing nuclear weapons states, and the risk of detection would be extremely high and would increase with each test.

16 With in-country networks of seismographs to enhance the detection capability of the global network, it is likely that even the most elaborate precautions would not prevent the detection of explosions at levels as low as 1 kiloton. Attempts to evade a nuclear test ban would therefore be confined to a level at which the military advantages to be gained from clandestine explosions would be minimal and the chances of escaping detection would be extremely low.

Other Verification Techniques

17 While seismic detection would be a vital factor in the monitoring of a CTBT, verification need not depend on this alone. A network for monitoring airborne radiation, as proposed by Sweden, would provide valuable collateral support to a global seismic monitoring network. Satellite surveillance data would also help confirm international adherence to a CTBT.

18 A recent development has been the increased acceptance of on-site verification in other areas of arms control, following the precedent first established by the

INF Treaty. This could also be extended to verification of a nuclear test ban. The ratification of the protocols to the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty has now set a further example for cooperation on verification procedures.

19 On-site verification, which is already widely accepted as an important component of arms control agreements, might also provide further assurance of compliance with a CTBT. The international disarmament process has advanced dramatically since the seismic monitoring network was first proposed, when national technical means were considered the only effective means of verifying compliance. Cooperation on measures for on-site verification, such as the placement of seismometers at possible test sites, would strongly reinforce a teleseismic verification system.

Wider Participation in Seismic Cooperation

20 In order to develop a global seismic monitoring capability down to a very low level it will be necessary to improve the coverage of seismic stations in Africa, South America and Antarctica. The involvement is therefore necessary of a wider group than is currently involved in the group of scientific experts (GSE) in the Conference on Disarmament.

Conclusions

21 In summary, New Zealand and Australia consider that there already exists compelling scientific evidence that a nuclear test ban is verifiable using technology currently available. The ongoing work of the Group of Scientific Experts is providing substantial technical corroboration for that view. The argument advanced by some nuclear testing states, that a nuclear test ban is not possible because it could not be verified, has consequently become increasingly difficult to sustain.

22 New Zealand and Australia consider that considerable progress has already been made towards the development of an adequate mechanism to verify a nuclear test ban. The ongoing work of the Group of Scientific Experts is important in this respect and it needs to continue its work with the benefit of a wider membership.

23 New Zealand and Australia welcomed the constructive discussion of verification issues at the Partial Test Ban Treaty Amendment Conference. The two countries had suggested that a significant achievement for the conference would be to:

- recognise the progress made towards a fully effective international verification system;
- endorse the efforts of the Group of Scientific Experts to demonstrate the technical feasibility of such a regime;
- call on more states to participate in the GSE to improve in particular coverage of seismic stations in Africa, South America, and Antarctica.

The widespread support for these general principles was encouraging. New Zealand and Australia believe that as a result of the discussions in New York there is greater international commitment to the important work on verification being carried out by the Group of Scientific Experts under the auspices of the Conference on Disarmament.

CONFERENCE ON DISARMAMENT

CD/1089
CD/NTB/WP/14
25 July 1991

Original: ENGLISH

LETTER DATED 9 JULY 1991 FROM THE HEAD OF THE SWEDISH DELEGATION
ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON
DISARMAMENT TRANSMITTING THE TEXT OF A DRAFT COMPREHENSIVE
TEST-BAN TREATY AND ITS ANNEXED PROTOCOLS

I have the honour to send you enclosed a draft CTB Treaty and its annexed protocols which will be introduced by the Delegation of Sweden on 25 July 1991. It will also be presented in the Ad Hoc Committee on a Nuclear Test Ban on that same day.

I should be grateful if it could be issued as an official document of the Conference and translated into all the official languages. It would be appreciated if the document could be available in all the official languages, dated on 25 July 1991 and numbered both as a CD document and as a Working Paper in the Ad Hoc Committee.

(Signed) Carl-Magnus Hyltenius
Ambassador
Head of the Swedish Delegation
to the Conference on Disarmament

DRAFT COMPREHENSIVE NUCLEAR TEST-BAN TREATY

Table of Contents

	<u>Page</u>
Preamble	2
Articles	2
Protocols	9
Protocol I The Organization	9
A. General Provisions	9
B. The Conference of the States Parties	9
C. The Executive Council	9
D. The Technical Secretariat	10
Protocol II Global Monitoring System	12
Part I International Exchange of Seismological Data	12
Part II Surveillance of Radionuclides in the Atmosphere	14
Part III Use of Satellite Data	16
Part IV Other Methods	16
Protocol III Procedures for On-Site Inspections and Monitoring	16
Part I Procedures for International On-Site Inspections	16
Part II Procedures for On-Site Monitoring of Large Non-Nuclear Explosions	18
Operational Manuals	20

DRAFT COMPREHENSIVE NUCLEAR TEST-BAN TREATY

The States Parties to this Treaty, hereinafter referred to as the "States Parties",

Convinced of the urgent need for an end to the nuclear arms race and the ultimate elimination of nuclear weapons,

Recalling the determination expressed by the Parties in the Preamble to the 1963 Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time, and to continue negotiations to this end,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures towards nuclear disarmament,

Urging the cooperation of all States in the attainment of this objective,

Convinced also that an end to nuclear testing by all States in all environments for all time is of fundamental importance to prevent the qualitative improvement and development of nuclear weapons and their further proliferation,

Have agreed as follows:

Article I

Basic Obligations

1. Each State Party undertakes to prohibit, to prevent, and not to carry out, in any environment, any test explosion of a nuclear explosive device.
2. Each State Party undertakes not to detonate anywhere any nuclear explosive device for peaceful purposes unless the States Parties have agreed on procedures for and controls of such nuclear explosions.
3. Each State Party undertakes, furthermore, to refrain from causing, encouraging, assisting, permitting or in any way participating in the carrying out anywhere of any nuclear explosion referred to in paragraphs 1 and 2 of this Article.

Article II

The Organization

1. The States Parties to the Treaty hereby establish a body hereinafter referred to as the "Organization" to achieve the objectives of the Treaty and to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among the States Parties.

2. All States Parties shall be members of the Organization.
3. The seat of the Headquarters of the Organization shall be ...
4. The organs of the Organization shall be the Conference of the States Parties, the Executive Council and the Technical Secretariat.
5. The Conference of the State Parties is composed of all States Parties. It is the principal organ and oversees the implementation of, and the compliance with, the Treaty. It shall oversee the activities of the Executive Council and the Technical Secretariat.
6. The Executive Council, which is the executive organ of the Conference of the States Parties, shall in particular

- promote the effective implementation of, and compliance with, the Treaty;
- facilitate consultation among States Parties to resolve issues related to the Treaty, in particular to verification of compliance with its provisions;
- supervise the operation of the Technical Secretariat.

The Executive Council shall comprise twenty-five State Parties serving for a period of two years. The members of the Executive Council shall be elected by the Conference of the States Parties, with due regard given to an equitable political and geographical representation.

7. The Technical Secretariat shall assist States Parties, the Conference of the States Parties, and the Executive Council on issues of verification. It shall be headed by a Director-General. The Secretariat shall, inter alia,

- coordinate international cooperative arrangements to exchange seismological data, data on radionuclides in the atmosphere and other data relevant to the monitoring of compliance with the Treaty;
- conduct on-site monitoring and inspection at the invitation of a State Party, or at the request of the Executive Council;
- cooperate with the National Authorities of the States Parties to resolve uncertainties that a State Party may have about an event relevant to compliance with the Treaty.

8. The duties, functions and organization of the Conference of the States Parties, the Executive Council and the Technical Secretariat are further outlined in Protocol I.

Article III

National Implementation Measures

1. Each State Party undertakes to take any measures it considers necessary to prohibit and prevent any activity in violation of the provisions of the Treaty anywhere under its jurisdiction or control.
2. Each State Party shall inform the Organization established pursuant to Article II of this Treaty of the legislative and administrative measures taken to implement the Treaty.
3. In order to fulfil its obligations under the Treaty, each State Party shall designate or set up a National Authority and shall so inform the Organization upon entry into force of the Treaty for such a State Party. The National Authority shall serve as the national focal point for liaison with the Organization and with other States Parties.
4. Each State Party undertakes to cooperate in good faith with the Organization in the exercise of the functions of the Organization and, in particular, to provide assistance to the Technical Secretariat, including data reporting on a routine basis and in response to requests, and to provide assistance for on-site inspections, as provided for in this Treaty.

Article IV

Verification

1. Each State Party undertakes to cooperate in good faith to facilitate the verification of compliance with this Treaty to clarify any event which might cause concern to other States Parties to the Treaty through:
 - an effective international exchange of seismological data;
 - an effective international exchange of measurements on radionuclides in the atmosphere;
 - additional relevant techniques as specified in Protocol II.

The arrangements for these international cooperative measures are laid down in Protocol II annexed to this Treaty.

Each State Party undertakes to establish the necessary facilities to participate in these cooperative measures and through its National Authority to establish the necessary communication channels with the Technical Secretariat.

These arrangements shall be operative on the entry into force of this Treaty.

2. Large non-nuclear explosions carried out by a State Party shall be conducted in accordance with provisions laid down in Protocol III.

3. The States Parties undertake to consult one another and to cooperate in good faith for the clarification of all events pertaining to matters relevant to compliance with this Treaty. Upon request from a State Party, the Technical Secretariat shall assist in this cooperation to facilitate the clarification of events observed. In accordance with this provision, each State Party undertakes:

- to provide the Technical Secretariat with any additional information it possesses that might assist in the interpretation of an event that may be of relevance to the Treaty which has occurred on its territory, or under its jurisdiction or control;
- to provide any relevant information, through the Technical Secretariat, in response to a request, by any other State Party.

4. Each State Party may conduct bilateral consultations with any other State Party on matters relevant to the Treaty, request information from any State Party, through the Technical Secretariat, on any events relevant to this Treaty occurring on the territory of that State or under its jurisdiction or control.

5. Each State Party may use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law to verify compliance with the Treaty. Each State Party undertakes not to interfere with national technical means of verification of any other State Party.

6. If a State Party is unable to clarify the nature of an event through the measures specified in paragraphs 1 through 5 of this Article, each State Party is entitled to request, through the Executive Council, an on-site inspection on the territory of any other State Party for the purpose of ascertaining whether or not a specified event was a nuclear explosion.

7. The requesting State Party shall state the reasons for its request, including the evidence available. The requested State Party is under the obligation to comply with a request for an inspection. Such an inspection shall be conducted by the Technical Secretariat, and the result shall be reported to the Executive Council and all States Parties. Procedures for such inspections, including the rights and functions of the inspecting personnel, are laid down in Protocol III.

8. An on-site inspection carried out by the Technical Secretariat may also follow an invitation to the Executive Council by the State Party on whose territory the event has occurred.

Article V

Non-compliance

1. If a State Party considers that another State Party has failed to fulfil its obligations to cooperate in good faith to facilitate the verification of this Treaty, it may raise the issue in the Executive Council. If the matter

cannot be resolved in the Executive Council, it may be taken up in the Conference of the States Parties. The Conference of the States Parties shall take the necessary measures to ensure compliance with the Treaty and to redress and remedy any situation which contravenes the provisions of the Treaty.

2. In cases where a State Party fails to fulfil a request to take measures to redress a situation which gives rise to problems with regard to its compliance with the Treaty, the Conference of the States Parties may request that the State Party's rights and privileges under the Treaty be suspended until it undertakes the necessary action to conform with its obligations under the Treaty.
3. Any State Party which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Treaty, may lodge a complaint with the Secretary-General of the United Nations. Such a complaint shall include all possible evidence confirming its validity, as well as a request for its consideration.
4. Each State Party undertakes to cooperate in good faith in carrying out any investigation which the Security Council may initiate in accordance with the provisions of the Charter of the United Nations on the basis of the complaint received by the Council.
5. The Secretary-General shall inform the States Parties of the results of the investigation. He shall further inform the Security Council of any indication that a State Party may have acted in breach of obligations under the Treaty and may request the Council to decide on measures necessary to ensure compliance with the Treaty.

Article VI

Privileges and Immunities

1. The States Parties to this Treaty shall grant privileges and immunities to the representatives of States Parties and the members of delegations to the Conference of the States Parties, the members of the Executive Council, the Director-General and the personnel of the Technical Secretariat in accordance with the Vienna Convention on Diplomatic Relations of 18 April 1961 in order to enable them to carry out the functions entrusted to them under this Treaty.
2. Provisions regarding privileges and immunities in connection with on-site inspections are contained in Protocol III.
3. The State Party in whose territory the Headquarters of the Organization is located shall, as soon as possible, conclude with the Organization a Headquarters Agreement covering privileges, exemptions and immunities.

Article VII

Annexes

The Protocols I, II and III to this Treaty constitute integral parts of the Treaty.

Article VIII

Amendments

1. At any time after the entry into force of this Treaty, any State Party may propose amendments to the Treaty or to any annexed Protocol. Any proposal for an amendment shall be communicated to the Depositary, who shall circulate it to all States Parties and seek their views on whether a conference should be convened to consider the proposal. If a majority, that shall not be less than twenty, of the States Parties so agree, the Depositary shall promptly convene a conference to which all States Parties shall be invited. The Conference may adopt amendments proposed, if a majority of the States Parties present and voting, including the nuclear-weapon States, so agree. Amendments shall enter into force for each Party accepting them upon their adoption by the Conference and thereafter for each remaining Party on the date of acceptance of the amendments by such a Party.

2. Proposals for amendments of provisions of a technical nature to be specified in Protocols I, II and III will be subject to a simplified amendment procedure conducted and decided by the Executive Council.

Article IX

Review of the Treaty

Five years after the entry into force of this Treaty, or earlier if it is requested by a majority of Parties to the Treaty by submitting a proposal to this effect to the Depositary, a conference of States Parties to the Treaty shall be held at, to review the operation of the Treaty, with a view to assuring that the purposes of the preamble and the provisions of the Treaty are being realized. Such review shall take into account any new scientific and technological developments relevant to the Treaty.

Article X

Entry into force

1. This Treaty shall be open to all States for signature. Any State which does not sign this Treaty before its entry into force in accordance with this Article may accede to it at any time.

2. This Treaty shall be subject to ratification by Signatory States.

3. This Treaty shall enter into force upon the deposit of instruments of ratification by forty Governments, including the nuclear-weapon States.

For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967.

4. For those States whose instruments of ratification or accession are deposited after the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

Article XI

Depositary

1. The Secretary-General of the United Nations shall be the Depositary of this Treaty and shall receive the instruments of ratification and instruments of accession.

2. The Depositary shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession and the date of the entry into force of this Treaty and of any amendments thereto, any notice of withdrawal, and the receipt of other notices. He shall also inform the Security Council of the United Nations of any notice of withdrawal.

3. This Treaty shall be registered by the Depositary in accordance with Article 102 of the Charter of the United Nations.

Article XII

Duration and Withdrawal

This Treaty shall be of unlimited duration. In exercising its national sovereignty, each State Party shall have the right to withdraw from the Treaty, if it decides that extraordinary events, related to the provisions of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to the Depositary three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

Article XIII

Official Languages

This Treaty, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send duly certified copies thereof to the Governments of the signatory and acceding States.

Article XIV

Signature

In witness whereof, the undersigned, duly authorized thereto, have signed this Treaty.

PROTOCOL I

The Organization

A. General Provisions

1. The Organization shall oversee the overall function of the Treaty and its verification arrangements and shall consist of the organs specified in Article III.
2. All States Parties to the Treaty shall be members of the Organization.
3. The cost of the Organization shall be borne by the States Parties in accordance with the United Nations scale of assessment.

B. The Conference of the States Parties

1. Each State Party shall have one representative in the Conference of the States Parties, who may be accompanied by alternates and advisers.
2. The Conference of the States Parties shall meet annually unless it decides otherwise.
3. The Conference of the States Parties shall take decisions on questions of procedure, including decisions to convene special sessions of the Conference, by a simple majority of the members present and voting. Decisions on matters of substance should be taken as far as possible by consensus. If consensus is not attainable when an issue comes up for decision, the Chairman shall defer any vote for 24 hours and during this period of deferment shall make every effort to facilitate achievement of consensus, and shall report to the Conference prior to the end of the period. If there is no possibility of achieving consensus at the end of 24 hours, the Conference shall take the decision by a two-thirds majority of members present and voting unless otherwise specified in the Treaty. When the issue arises as to whether or not the question is one of substance, that question shall be treated as one of substance unless otherwise decided by the Conference by the majority required for decisions on questions of substance.

C. The Executive Council

1. The Executive Council is responsible to the Conference of the States Parties. It shall carry out the powers and functions entrusted to it under the Treaty and its Protocols, as well as such functions delegated to it by the Conference of the States Parties. In so doing, it shall act in conformity with the recommendations, decisions and guidelines of the Conference of the States Parties and assure their continuous and proper implementation.
2. The Executive Council shall keep the overall operation of the Treaty and its verification arrangements under review to promote the effective implementation of and compliance with the Treaty. It shall facilitate

consultation among States Parties to resolve issues related to the Treaty, in particular to its verification, and supervise the operation of the Technical Secretariat.

3. The Executive Council shall decide on proposals for amendments to Protocols II and III of this Treaty on matters concerning the equipment and technical procedures to be used to verify compliance with the Treaty following proposals from a State Party or from the Technical Secretariat. An Advisory Board of international experts shall be established to provide scientific expertise on verification measures and to assist the Executive Council in assessing the value of new methods to be considered for the verification of this Treaty.

4. The Executive Council shall supervise the operation of the Technical Secretariat and therewith in particular:

- appoint its Director-General;
- decide on its annual budget;
- receive and review its reports submitted every three months and annually.

5. The Executive Council shall facilitate consultations among States Parties to resolve issues related to the Treaty, in particular to its verification. The functions of the Executive Council with regard to on-site inspections are laid down in Article V and Protocol III.

6. The Executive Council shall meet annually. Between sessions it shall meet as often as required to fulfil its functions. It shall elect its own Chairman.

7. Decisions by the Executive Council on (to be specified) are taken by simple majority.

D. The Technical Secretariat

1. A Technical Secretariat shall be established to assist States Parties, the Conference of the States Parties and the Executive Council on issues of verification. The Technical Secretariat shall, inter alia,

- coordinate international cooperative arrangements to exchange seismological data, data on radionuclides in the atmosphere and other data relevant to the monitoring of the Treaty;
- conduct on-site monitoring and inspection at the invitation of a State Party or at the request of the Executive Council;
- cooperate with the National Authorities of the States Parties to resolve uncertainties regarding compliance with the Treaty.

2. The Technical Secretariat shall coordinate the operation of the global seismological network and in particular

- operate the International Data Centre to compile, analyse and report on seismic data;
- supervise the operation of participating seismological stations and their reporting;
- provide technical assistance in the installation and operation of seismological stations;
- compile and assess results and experience of the operation of the seismological network.

3. The Technical Secretariat shall coordinate the operation of the network for global surveillance of radionuclides in the atmosphere and in particular

- operate the International Data Centre to compile, analyse and report data on radionuclides in the atmosphere;
- supervise stations which are monitoring radionuclides in the atmosphere;
- provide technical assistance in the installation and operation of monitoring stations;
- compile and assess results and experiences of the operation of a network for global surveillance of radionuclides in the atmosphere.

4. Upon request, the Technical Secretariat shall assist States Parties in using satellite observations to clarify seismic and other events in relation to this Treaty and

- ensure access to relevant, publicly available satellite data;
- process and analyse satellite data to facilitate the interpretation and clarification of seismic events.

The Technical Secretariat shall also compile, analyse and report on hydroacoustic signals in the ocean and other relevant data provided by States Parties to facilitate the verification of this Treaty.

5. The Technical Secretariat shall receive, compile and report to all States Parties any additional information that a State Party may provide to assist in the interpretation of an event which has occurred on its territory.

The Technical Secretariat shall forward requests for information made by any State Party to any other State Party on any event relevant to this Treaty occurring on the territory of the latter State. The Technical Secretariat shall receive, compile and report on any information received in response to such requests.

6. The functions of the Technical Secretariat with regard to on-site inspections are laid down in Article IV and Protocol III.
7. Upon invitation through the Executive Council, the Technical Secretariat shall conduct on-site monitoring of large non-nuclear explosions, exceeding 100 tons TNT equivalent, and report the result of such observations to the States Parties. The Technical Secretariat shall also compile and distribute a monthly list of reported non-nuclear explosions, exceeding 10 tons TNT equivalent.
8. The Technical Secretariat is authorized to propose to the Executive Council amendments of a technical nature to Protocols II and III of this Treaty. The Technical Secretariat is also authorized, in consultation with the National Authorities of States Parties, to make modifications in the Operational Manuals of the verification systems referred to in Protocols II and III. Such modifications shall be reported to the Executive Council.
9. The Technical Secretariat shall comprise a Director-General, appointed by the Executive Council for a period of four years, who shall be its Head and Chief Administrative Officer and such scientific, technical and other personnel as may be required. The Director-General may be reappointed for one further term, but not thereafter. Only citizens of States Parties shall serve as Inspectors or as other members of the professional and clerical staff of the Technical Secretariat.
10. The Technical Secretariat shall, on an annual basis, submit its budget proposal to the Executive Council. The Technical Secretariat shall further report to the Executive Council on its activities every three months, and annually.

PROTOCOL II

Global Monitoring System

Part I

International Exchange of Seismological Data

1. Each State Party to the Treaty undertakes to cooperate in good faith in an international exchange of seismological data to assist the States Parties in the verification of the Treaty by providing additional technical information for their national assessment. These international cooperative measures include 50-100 high-quality designated seismological stations, including seismic arrays in participating countries and in other territories, efficient systems for the exchange of seismological data, and an International Data Centre. The operation of the system shall be coordinated by the Technical Secretariat and guided by the Operational Manual for International Exchange of Seismological Data.

2. Each State Party shall have the right to participate in the international exchange of seismological data by contributing data from one or more designated seismological stations and to receive all the seismological data made available through the international exchange. Each State Party should cooperate with the international exchange. Each State Party should cooperate with the international system through its National Authority. To ensure that seismological stations with the necessary geographical coverage will be incorporated in the exchange, the States listed in Table I have agreed to provide data from the stations specified in the same Table.

Each State Party participating in the international data exchange shall provide geographical coordinates, a description of the seismic noise and the geological site, and a description of the instrumentation of each designated station. Any changes in these data shall be reported immediately. Data on designated stations are collected, compiled and regularly reported to the States Parties by the Technical Secretariat.

In consultation with the States Parties, the Technical Secretariat shall identify the need for data from additional stations or from high-quality stations and how such needs should be met. The Technical Secretariat shall also provide technical assistance to establish, operate and maintain new seismic high-quality stations in regions of the world where there is a lack of such stations.

3. The seismological stations designated for participation in the international exchange shall have the basic equipment specified in the Operational Manual. These stations shall be operated, calibrated and maintained as specified in the Manual. Information on the operation and the calibration of the stations shall be sent regularly to the Technical Secretariat.

4. Seismological data from each designated station shall be reported routinely and on a regular basis through the appropriate National Authority. The seismological data to be reported, the reporting format and the time schedule are specified in the Operational Manual.

In addition to routinely submitted data, each State Party participating in the international data exchange shall provide any relevant seismological data from its designated stations which are requested through the International Data Centre by any other State Party. The procedures for making such requests and the format and time schedule for responding to them are laid down in the Operational Manual.

5. An International Data Centre shall be established by the Technical Secretariat. Easy and free access for representatives of all Parties to the Treaty shall be granted to all facilities of the International Data Centre.

6. The International Data Centre shall routinely receive all seismological data contributed to the international exchange by its participants, process these data, without interpreting them, distribute such data to all

participants within one week, store all data contributed by participants as well as the results of the processing at the Centre. The procedures to be used at the International Data Centre are laid down in the Operational Manual. The International Data Centre shall further coordinate requests for additional seismological data from one State Party to another Party and circulate data obtained as a result of such requests.

7. Each State Party is encouraged to assist in the assessment of the nature of the seismic events located by the International Data Centre by contributing any additional information available about events located in its own territory.

Table 1

State	Station
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Part II

Surveillance of Radionuclides in the Atmosphere

1. Each State Party undertakes to cooperate in good faith in an international network for surveillance of radionuclides in the atmosphere. These international cooperative measures include 50-100 designated sampling stations for radionuclides in the atmosphere in participating States and in other territories, national or regional analysis laboratories, systems for the evaluation and exchange of these measurements, and the International Data Centre established for this purpose. The operation of the System shall be coordinated by the Technical Secretariat and guided by the Operational Manual for the Surveillance of Radionuclides in the Atmosphere.

2. Each State Party shall have the right to participate in the international surveillance of radionuclides in the atmosphere by contributing measurements of samples from one or more designated stations and to receive all the information made available through the international exchange. To ensure the necessary geographical coverage of sampling stations for radionuclides in the atmosphere, the States listed in Table 2 have agreed to provide measurements of samples from the stations specified in this Table.

Each State Party participating in the international surveillance shall provide geographical coordinates and a description of the instrumentation of each designated station as well as of the techniques applied in the laboratories carrying out the analysis. Any changes in these data shall be reported immediately. Data on designated stations and laboratories are collected, compiled and regularly reported by the Technical Secretariat.

3. The sampling stations and the analysis laboratories for radionuclides in the atmosphere designated for participation in the international exchange shall have the basic equipment specified in the Operational Manual for the Surveillance of Radionuclides in the Atmosphere. These stations and laboratories shall be operated and maintained as specified in this Manual. Information about the operation and maintenance of the stations and laboratories shall be sent to the Technical Secretariat on a regular basis.

4. Measurements of radionuclides in the atmosphere from each designated station shall be reported routinely and on a regular basis through the appropriate National Authority. The measurements of samples to be reported, the reporting format and time schedule are specified in the Operational Manual. A State Party shall cooperate in good faith with the International Data Centre to clarify any technical question regarding data reported.

In addition to routinely submitted measurements, each State Party participating in the international measurements exchange shall provide any relevant measurements from its designated stations requested through the International Data Centre by any State Party. The procedures for making such requests and the format and time schedule for responding are laid down in the Operational Manual.

5. An International Data Centre for the exchange of measurements on radionuclides in the atmosphere shall be established by the Technical Secretariat. Easy and free access for representatives of all States Parties shall be granted to all facilities of the International Data Centre.

The International Data Centre shall receive all measurements on radionuclides in the atmosphere contributed to the international exchange by its participants and routinely analyse and process these measurements according to established procedures. For observed release of radionuclides in the atmosphere, the time and location of the source shall be evaluated. In this analysis, relevant wind trajectories obtained from meteorological data shall be used. The results of the analysis shall be distributed to all participants within one week, and the records thereof be kept at the Centre. The procedures to be used in the analysis at the International Data Centre are laid down in the Operational Manual.

The International Data Centre shall also coordinate requests for additional measurements from one State Party to another and circulate the information obtained as a result of such requests.

Table 2

State	Station
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Part III

Use of Satellite Data

1. In order to assist in the interpretation of seismic and other events relevant to this Treaty and to facilitate the use by States Parties of satellite images, the Technical Secretariat shall ensure access to relevant data obtained from available satellite systems.
2. The Technical Secretariat shall assist States Parties in utilizing satellite data by establishing and operating a Satellite Image Processing Centre. This Centre shall have the capability to store available satellite data and to process such data according to specified procedures at the request of any State Party. The operation of the Satellite Image Processing Centre shall be guided by the Operational Manual for Satellite Data Processing.
3. Each State party operating an unclassified satellite system which provides images with a coverage and resolution relevant to this Treaty undertakes to make such image data available on terms to be agreed with the Technical Secretariat.

Part IV

Other Methods

1. The Technical Secretariat shall facilitate cooperation among States Parties in using additional means of verification which any State Party may find useful. The Technical Secretariat shall receive, compile and circulate any data relevant to the verification of this Treaty which any State Party makes available.
2. The Technical Secretariat shall, in consultation with the States Parties, provide technical assistance to establish, operate and maintain such additional means of verification.
3. Additional means of verification of compliance with this Treaty might include hydroacoustic measurements in the sea and acoustic and ionospheric measurements in the atmosphere.

PROTOCOL III

Procedures for On-Site Inspections and Monitoring

Part I

Procedures for International On-Site Inspections

1. The basic rules for verification through on-site inspection are laid down in Article IV of this Treaty.

2. The purpose of an international on-site inspection is purely fact-finding, and the Team of International Inspectors (hereinafter referred to as the Inspection Team) dispatched by the Technical Secretariat shall not make any assessment as to the nature of the event inspected. The Inspection Team shall present a factual report of the observations made during the inspection. As far as possible, this report shall represent the consensus view of the participating experts. If and where consensus cannot be achieved, the report shall reflect the views of all the participating inspectors.

3. The Inspection Team shall begin its inspection in the specified area to be inspected not later than seven days after it receives a request for inspection from the Executive Council. This area must be continuous and not exceed 1,000 km² or a distance of 50 km in any direction. An inspection may last for a maximum time period of seven days after the arrival of the Inspection Team at the point of entry in the territory of the State Party to be inspected.

4. During an international on-site inspection, the Inspection Team shall be entitled to

- conduct visual inspections of the area from the air and on the ground;
- conduct inspections of the area using infrared means of observation from the air and on the ground;
- take photographs in the visual and infrared parts of the spectrum from the air and on the ground;
- measure radioactive radiation in the atmosphere above the area, at ground level and in water;
- conduct temporary seismological measurements in the area.

5. The Director-General of the Technical Secretariat shall notify the inspected State Party not less than [12] hours prior to the planned arrival of the Inspection Team at the point of entry. Simultaneously the members of the Executive Council shall be informed about the request.

6. An international on-site inspection shall be carried out by the personnel and experts of the Technical Secretariat. The rules and detailed procedures for such on-site inspections are laid down in the Manual for International On-Site Inspections. The Inspectors shall be selected taking into account available expertise and must not include any national of the requesting State Party. The Inspection Team shall be headed by an officer from the Technical

Secretariat and contain additional Inspectors. The Inspection Team shall further comprise the necessary technicians, interpreters and secretaries provided by the Technical Secretariat. The total number of an Inspection Team shall not exceed

At all times while the inspecting personnel are in the territory of the State Party to be inspected, their persons, property, personal baggage, archives and documents as well as their temporary official and living quarters shall be accorded the same privileges and immunities as provided in Articles 22, 23, 24, 29, 30, 31, 34, and 36 of the Vienna Convention on Diplomatic Relations to the persons, property, personal baggage, archives and documents of diplomatic agents as well as to the premises of diplomatic missions and private residences of diplomatic agents.

Without prejudice to their privileges and immunities, it shall be the duty of the inspecting personnel to respect the laws and regulations of the State in the territory of which the inspection is to be carried out, in so far as such laws and regulations do not impede in any way whatsoever the proper exercising of the rights and functions provided for by the Treaty and this Protocol.

Part II

Procedures for On-Site Monitoring of Large Non-Nuclear Explosions

1. In order to avoid misinterpretation of large non-nuclear explosions, the Party conducting such an explosion must follow specified rules and procedures. For an explosion with a yield exceeding 100 tons TNT equivalent or any group of explosions with an aggregate yield exceeding the same limit, the State Party conducting such an explosion shall notify the Technical Secretariat not later than 60 days prior to the event. This notification shall include

- the time, location, purpose and yield of the explosion;
- a full description of the event, including a timetable for loading the charge;
- any other relevant information that a State Party wishes to submit.

2. A State Party conducting an explosion with a yield exceeding 10 tons but not exceeding 100 tons of TNT equivalent shall provide the Technical Secretariat with information on such an event not later than seven days after the explosion.

3. Personnel from the Technical Secretariat shall monitor on-site the preparations for, and the detonation of, any non-nuclear explosion with a yield exceeding 100 tons TNT equivalent.

Based on the information provided by the State Party conducting the explosion, the Director-General of the Technical Secretariat shall decide from what date observers shall follow the preparation work. The on-site observation shall include the conduct of the explosion and observation of its result. The detailed rules and procedures are laid down in the Operational Manual for On-Site Monitoring of Large Non-Nuclear Explosions.

4. The personnel conducting the on-site monitoring shall be allowed to follow the preparation of the explosion, including the loading of the charge or charges. They should further be allowed to take pictures and to make measurements of radioactive radiation in the air and in water in the vicinity of the event, prior to and after the explosion.

5. The Technical Secretariat shall establish a factual report of each large non-nuclear explosion monitored and submit the report to all States Parties and to the Executive Council.

6. On-site monitoring of a large non-nuclear explosion shall be carried out by the Technical Secretariat using its own personnel and experts provided by States Parties, at the request of the Director-General of the Technical Secretariat. The observers shall be selected taking into account available expertise and must not include any national of the requesting State Party. The Inspection Team shall be headed by an officer from the Technical Secretariat and contain additional observers. The Inspection Team shall further comprise the necessary technicians, interpreters and secretaries provided by the Technical Secretariat in accordance with the need in each particular case. The total number of such support personnel shall not exceed

At all times while the inspecting personnel are in the territory of the State Party to be inspected or in a territory under the jurisdiction or control of that State Party, their persons, property, personal baggage, archives and documents as well as their temporary official and living quarters shall be accorded the same privileges and immunities as provided in Articles 22, 23, 24, 29, 30, 31, 34 and 36 of the Vienna Convention on Diplomatic Relations to the persons, property, personal baggage, archives and documents of diplomatic agents as well as to the premises of diplomatic missions and private residences of diplomatic agents.

Without prejudice to their privileges and immunities, it shall be the duty of the inspecting personnel to respect the laws and regulations of the State in whose territory the inspection is to be carried out, in so far as such laws and regulations do not impede in any way whatsoever the proper exercising of the rights and functions provided for by the Treaty and this Protocol.

OPERATIONAL MANUALS

In addition to the Treaty and its Protocols the following Operational Manuals should be established to guide the operation of the various components of the verification system:

- Operational Manual for International Exchange of Seismological Data;
- Operational Manual for the Surveillance of Radionuclides in the Atmosphere;
- Operational Manual for Satellite Data Processing;
- Operational Manual for International On-site Inspections;
- Operational Manual for On-Site Observations of Large Non-Nuclear Explosions.

These manuals are not an integral part of the Treaty and can be changed by the Technical Secretariat in consultation with States Parties. The Executive Council shall be informed of changes in the Operational Manuals.

CONFERENCE ON DISARMAMENT

CD/1094
7 August 1991

Original: ENGLISH

LETTER DATED 2 AUGUST 1991 FROM THE PERMANENT REPRESENTATIVE OF CANADA ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE ARMS CONTROL VERIFICATION OCCASIONAL PAPER NO. 8, ENTITLED "NUCLEAR TEST BAN VERIFICATION: RECENT CANADIAN RESEARCH IN FORENSIC SEISMOLOGY" 1/

I have received copies of the 8th in Canada's series of Arms Control Verification Occasional Papers, entitled "Nuclear Test Ban Verification: Recent Canadian Research in Forensic Seismology" and I would like to share them with you and with my CD colleagues. I would be grateful if you would arrange to circulate them, under a CD number, to all member and non-participating state delegations.

(Signed) Gerald E. Shannon
Ambassador and
Permanent Representative

1/ A limited distribution of this brochure in English only has been made available to the members and non-members invited to participate in the work of the Conference on Disarmament. Additional copies are available from the Permanent Mission of Canada.

CONFERENCE ON DISARMAMENT

CD/1097

9 August 1991

Original: ENGLISH

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE THIRTY-SECOND SESSION OF THE AD HOC GROUP OF SCIENTIFIC EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE MEASURES TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-second formal session from 29 July to 9 August 1991, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-fourth session of the Group convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group continues to be open to all member States of the Conference on Disarmament, as well as upon request to non-member States. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Belgium, Canada, China, Czech and Slovak Federal Republic, Egypt, Germany, Hungary, Indonesia, Iran (Islamic Republic of), Italy, Japan, Netherlands, Pakistan, Peru, Poland, Romania, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. At their request and on the basis of previous invitations by the Conference on Disarmament, scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Denmark, Finland, New Zealand, Norway, Spain and Switzerland.
4. Two representatives of the World Meteorological Organization (WMO) also attended the session. The Ad Hoc Group expressed its appreciation of the efforts of the WMO in connection with the GSETT-2 experiment. The Group is prepared to continue its cooperation with the WMO in order to take advantage of the possibilities offered by its Global Telecommunication System.

5. Upon the invitation of the Conference on Disarmament, a representative of the International Maritime Satellite Organization (INMARSAT) attended the session of the group to discuss possibilities for the use of INMARSAT in the development of the communications aspect of a future global seismic data exchange system. The Ad Hoc Group highly appreciated the presentation and technical demonstration given by the representative of INMARSAT on its high speed data communication possibilities. INMARSAT mobile earth stations could provide data communication from regions of the globe that currently are not adequately served by existing communication systems. The INMARSAT representative noted that the INMARSAT system is open for immediate use by the Group, subject to the regulations in the countries in which the earth stations are to be placed. No formal decision needs to be taken by INMARSAT in this regard. The Group also received a report on the successful initial use of the INMARSAT system for the exchange of Level I and Level II seismic data during GSETT-2.
6. Under the current mandate of the Ad Hoc Group, information on national investigations related to the work of the Group has been presented by experts from Australia, Austria, Belgium, Bulgaria, Canada, China, Czech and Slovak Federal Republic, Denmark, Egypt, Finland, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Kenya, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Romania, Spain, Sweden, Switzerland, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland, United States of America and Zambia.
7. In 1987, the Ad Hoc Group agreed to conduct a large-scale international experiment on the exchange and analysis of seismic waveform (Level II) and parameter (Level I) data. The experiment was named GSETT-2 (the Group of Scientific Experts' Second Technical Test). The principal purpose of GSETT-2 was to test methods and procedures developed by the Ad hoc Group to expeditiously extract and transmit the data from stations to Experimental International Data Centers (EIDCs), to process them at EIDCs and to transmit the results back to participants.
8. The Ad Hoc Group reviewed the results of the full-scale phase of GSETT-2, which was successfully conducted during the period 22 April to 9 June 1991. The Group noted that 34 countries participated in this test, providing seismic data for 42 consecutive data days from 60 stations distributed around the globe. During this time, the participating countries operated National Data Centers (NDCs), some with assistance from other countries. Four Experimental International Data Centers (EIDCs) were operated, and a variety of international communication links were utilized.
9. The Ad Hoc Group noted with satisfaction that the participation in the full-scale test was broadened compared to earlier preparatory tests. In particular the Group welcomed the participation of several additional countries in South America and Africa, which implied an improvement in obtaining seismological observations in these regions. The Group noted that significant technical cooperation took place among many countries, and expressed its appreciation for the efforts in supporting the participation of new countries.

10. In reviewing the results of GSETT-2, the Ad Hoc Group noted that many of the components of the experimental global system had functioned well, taking into account the size and complexity of this undertaking. The procedures and instructions were generally followed. Valuable experience was gained at both national and international centres. This test was a large and in many ways unprecedented undertaking because of the complexity of the system, especially the communications links used, and the expeditious nature of daily seismic event bulletin preparation and exchange.
11. The large-scale experiment could not have been successfully conducted without preparation of detailed instructions, acquisition of necessary equipment and adequate preparatory testing. The Ad Hoc Group expressed its appreciation of the efforts of the Coordinator of GSETT-2, Mr. Peter Basham of Canada. The Group also expressed its appreciation to the Coordinator of the "Sourcebook for Seismic Data Exchange", Ms. Ann Kerr of the United States, for her efforts in preparing this comprehensive reference manual.
12. The Group noted that as a result of GSETT-2, a unique seismological database has been established. These data will be of great value for future scientific investigations in many areas.
13. The Group noted that a comprehensive evaluation of the results from GSETT-2 will be a substantial undertaking. The Group noted that an important aspect of the evaluation would be to refine the concepts of a global system as described in the Group's Fifth Report (CD/903 and Corr.1). At its thirty-first session, the Ad Hoc Group established five study groups, each headed by a Convenor, to deal with different aspects of this work. The Group reviewed initial draft outlines of chapters of its envisaged report, elaborated by the Convenors.
14. A summary report on the preliminary results of the test, compiled by the Convenors of the five study groups, is annexed to this progress report.
15. The Group agreed that the Convenors should elaborate complete draft chapters and submit them to the Scientific Secretary in advance of the next session. These will form a basis for a draft report which will be distributed in advance of and reviewed during the next session.
16. The Group will make all effort to complete a report on a comprehensive evaluation of the technical and factual aspects of the test during the spring session of 1992. While it may be possible to summarize the technical conclusions from GSETT-2 during the next session of the Group, the full seismological evaluation will need considerably more time, and will be reported on later. In this regard, the Group believes it will be important to carry out additional checking of the procedures which will be used in the evaluation of GSETT-2. It will be desirable to have facilities available that would provide for taking part in tests that may be required for the successful evaluation of GSETT-2. The Group will again consider this issue at the next session.

17. The Ad Hoc Group continued its preliminary discussion on the work of the Group remaining under its current mandate as regards international cooperative measures to detect and identify seismic events. The Group expressed the view that much valuable work could be conducted in this context. The Group expects to be able to develop specific recommendations in this regard during its next session, taking into account the results of GSETT-2.

18. The Ad Hoc Group appreciated the opportunity to attend informal technical presentations made by Canada on new methodologies in seismic verification, and by Germany on the concept of an open CD-seismic station.

19. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 2 to 13 March 1992.

ANNEX

Summary report on the preliminary results of the Group of
Scientific Experts' Second Technical Test (GSETT-2)*

1. Introduction

In 1987, the Ad Hoc Group of Scientific Experts (the GSE) agreed to conduct a large-scale international experiment on the exchange and analysis of seismic data. The experiment was named GSETT-2 (the Group of Scientific Experts' Second Technical Test). In the document CD/745 the Group stated that:

"The principal purpose of this experiment should be the testing of methods and procedures developed by the Ad Hoc Group to expeditiously extract and transmit the data from stations to Experimental International Data Centers (EIDCs), to process them at EIDCs and to transmit the results back to participants."

The Group's Fifth Report (CD/903 and Corr. 1) describes the initial design concepts of a modern international seismic monitoring system. These technical concepts which were to be tested during GSETT-2, are based on expeditious exchange of waveform (Level II) and parameter (Level I) data and processing of such data at International Data Centers (IDCs). The proposed system consists of four major elements:

- (i) A global network of high-quality seismograph stations, including seismic arrays, each conforming to specified technical standards and operated according to internationally agreed rules.
- (ii) Government-authorized National Data Centers (NDCs) responsible for providing agreed seismic data from national stations to IDCs.
- (iii) International Data Centers to collect and analyse seismic waveform and parameter data, to distribute the results of these analyses and to make the data readily accessible to all participants.
- (iv) Telecommunications channels for the expeditious exchange of data between NDCs and IDCs, as well as among IDCs.

In its progress reports to the Conference on Disarmament, the Ad Hoc Group has described the various stages in the planning and development of GSETT-2. In addition, two internal documents (Conference Room Papers 167 and 190) contain comprehensive descriptions of the experimental facilities being developed and the procedural arrangements. Mr. Peter Basham of Canada has served as the Coordinator of GSETT-2.

* Compiled by the Convenors of the five study groups.

GSETT-2 is comprised of four distinct phases:

- Phase 1: Establishing the facilities and procedures that would form parts of the experimental system to be tested;
- Phase 2: Limited short-time tests of the experimental system, in preparation for full-scale testing;
- Phase 3: (The main phase of GSETT-2): Full-scale testing, for 42 consecutive data days, of the entire experimental system;
- Phase 4: Evaluation of the results of GSETT-2.

The experiences during Phase I and Phase II of GSETT-2 and the preparatory test (November-December 1991) of Phase 3 were essential for the successful conduct of the full-scale test (Phase 3).

This initial evaluation report summarizes the results of the main phase (Phase 3), which was conducted during the time period 22 April-9 June 1991.

2. Seismograph Stations and Station Network

There are two types of seismograph stations available which may be combined in an appropriate way to form a global network. One is the single-site three-component seismograph system capable of extracting data in both the short period and long period bands, and the other is a seismic array station where many seismographs are arranged in a certain geometrical pattern and jointly operated.

In Phase 3 of the GSETT-2 experiment 34 countries took part with altogether 60 stations (12 arrays and 48 single-site stations). Most of the stations were high quality digital recording systems providing both Level I and Level II data. Stations with analog recording systems were also used in a few cases. While these stations provided only Level I data, they served to improve the geographical coverage. Various designs of "CD-standard stations" were tested during the experiment.

The station network in use during the full-scale test comprised stations on all continents. Still, the actual geographical distribution of stations was far from ideal, with a very dense coverage in parts of Europe and sparse coverage especially in Africa and South America.

The initial evaluation of GSETT-2 has confirmed the importance of deploying seismograph stations at sites with low background noise levels. Stations situated on islands and in coastal areas generally contributed far less than sensitive stations in the interior of continents, but they were important in some cases.

GSETT-2 has confirmed the importance of array stations in detecting weak seismic events at all distances, and in providing initial event location information. Modern three-component stations were also found to be valuable.

It can be concluded that modern technology and recent scientific developments permit high flexibility in station deployment and lower operation and maintenance costs. All of these features, as well as the increased efficiency and reliability of station hardware and software, were demonstrated in the course of GSETT-2.

3. National Data Centers (NDCs)

During the full-scale test 34 countries successfully operated national data centres (NDCs), some with assistance from other countries. Thus there were several countries which under bilateral arrangements either operated an NDC for another country or performed one or more of the NDC functions (e.g. Level I data extraction, GSE message formatting, etc.) for another country. This test was a large undertaking. More than 100 people were involved at NDCs during Phase 3. NDCs reported over 100,000 parameters with their associated waveforms to EIDCs. These data were contained in over 20,000 messages and amounted to about 500 Mbytes. In a new and unique contribution, NDCs reported about 5,000 locations of seismic events based on only national data.

In order to accomplish this tremendous task, many NDCs operated automatic seismic event detectors and utilized state-of-the-art computer hardware and software to perform interactively many of the NDC functions, such as parameter and waveform data extraction. In addition, some countries were able to utilize semi-automatic procedures for handling GSE messages including responding to requests for additional data. It should be noted that a number of countries were able to participate in the full-scale test with only limited data reporting. Reasons for this included limited funds, relatively poor station availability, etc.

Nevertheless, a valuable database has been assembled which will be available for the comprehensive evaluation (Phase 4) of GSETT-2.

Although preliminary indications are that procedures and instructions for operating NDCs generally worked well, it is clear that some modifications are needed. It will be necessary to work further towards developing common procedures for automatic and interactive analysis at NDCs.

Most NDCs successfully received all Final Event Bulletins (FEBs) from the EIDCs; however, these were generally one or two days later than the planned seven-day schedule, with a few cases of fifteen days or more late. Some NDCs did not receive all FEBs. Many NDCs made preliminary analyses of the FEBs which suggested that some procedures, such as automatic association and location need to be improved.

The GSETT-2 provided the first opportunity to test the procedures for requests to NDCs for additional data. While some NDCs were able to respond completely and quickly, problems in this area remain.

4. Experimental International Data Centers (EIDCs)

Four Experimental International Data Centers (EIDCs) were operated during Phase 3 of GSETT-2: Canberra (CNB), Moscow (MOS), Stockholm (STO) and Washington (WAS). High-speed communication links were implemented between the four EIDCs.

A total of about 65,000 phase detections were reported from 57 stations in 34 countries. Twenty-seven (27) countries submitted a total of more than 80,000 waveform segments (Level II data) recorded at 47 stations. Less than 2 per cent of a total of 36,000 messages contained format errors, and roughly 20 per cent of the 65,000 phase detections arrived late (i.e. after the deadline according to the rules). More than 3,000 duplicate messages (several hundred megabytes) were received by the EIDCs.

The daily volumes during Phase 3 had increased by a factor of two compared to earlier experiments of GSETT-2. This was partly due to more local and regional phases reported by many NDCs compared to earlier. These additional phases also partly explain why more than 50 per cent of the reported phases could not be associated to an event. The EIDCs have received and transmitted requests from and to both NDCs and other EIDCs. Some EIDCs satisfied most of the incoming requests and transmitted their response in time while others encountered problems due to software difficulties, lack of fully automatic request handling programmes and insufficient manpower.

The importance of an EIDC's ability to request supplemental data is demonstrated by the fact that, for instance, several hundred new phases with observable signals were picked by the EIDCs from examination of waveform segments received in response to requests.

The use of waveforms improved the quality of the event lists considerably, in particular the depth estimation was improved. However, further investigation is necessary to make an accurate assessment. The reconciliation of the seismic analysis between the EIDCs was done through a regular (i.e. daily) exchange of IELs and CELs. Approximately 40 per cent of the events in the FEBs were reported by all four EIDCs and 60 per cent by at least three EIDCs. The fact that the results of the EIDCs were not essentially identical will be subject to further evaluation studies.

The locations and comments supplied in addition to the phase reports by the NDCs were not used to the extent expected.

As a preliminary conclusion, it may be stated that the overall performance of many of the EIDC procedures were satisfactory. Adequate improvements of the applied rules and procedures will be recommended after completion of the already started detailed evaluation of the EIDC performances during GSETT-2.

5. Communications

The overall impression from Phase 3 of GSETT-2 is that the communications network, comprising NDC to EIDC as well as inter-EIDC links, worked very well. The network in place for Phase 3 was composed of a large variety of types of physical links, and a range of different protocols were utilized. With a few exceptions, the elements of this network fulfilled the basic objective of enabling expeditious exchange of large amounts of seismic data and other messages.

Problems encountered with the use of NDC to EIDC links were very few. It became apparent, however, that use of WMO/GTS for transmission of large volumes of data (such as waveform data and FEBs) met with a moderate degree of success only. For several countries, however, the WMO/GTS represented the only means for transmission of seismic data and in general proved useful for reporting parameter data.

Many countries made use of the international Packet-Switched Data Network Services, and a number of NDCs established direct computer-to-computer links via dial-up circuits. Experience with such links was very favourable. Some countries established alternative routings that were used successfully during outages of their "main" communications link. The INMARSAT system for exchanging Level I and Level II data was tested for the first time.

The inter-EIDC communications network comprised high speed dedicated satellite, fibre optical and land links between the four EIDCs, the Washington Communications HUB and the Stockholm Communications Node. After the installation of the satellite link between Moscow and Washington on 29 April, the inter-EIDC communications network worked extremely well, taking into account the complexity of the system and the large amount of data handled. There were some problems related to the generation of duplicate messages, but it is expected that only minor modifications are needed to remedy this problem.

6. Seismological Evaluation

An important aspect of the performance of a global seismological monitoring system is the completeness and quality of the final event bulletin (FEB). This seismological output is closely linked to the adequacy of the technical components of the monitoring system, it especially depends on the spatial distribution of seismic stations. For GSETT-2, a very heterogeneous global coverage yielded large regional variations in detection threshold and a large number of unassociated single station detections. About one half of the participating stations were situated in and around Europe, consequently a large number of small events were detected, mainly quarry blasts and rock bursts of magnitude 1 to 4.

On the other hand, epicentres of larger earthquakes reported in the FEBs are not restrained by well-known plate boundaries but show a significant scatter. This observation leads to the conclusion that the FEBs, in general, have to be re-evaluated without the time pressure given during the experiment, before a comprehensive seismological evaluation can begin.

This evaluation will compare the EIDC epicentres, hypocentres, and magnitudes with results of well-established agencies on a global scale (e.g. National Earthquake Information Center in the United States) and for specific regions like Europe (European Mediterranean Seismic Centre).

In addition, the unique data set collected during GSETT-2 should be evaluated in all aspects which are relevant to the identification of seismic sources. This topic - although of crucial importance for States in their national monitoring of compliance with a nuclear test-ban treaty - has not yet been addressed by the GSE. For the first time, there is now, through GSETT-2 data, a common basis to start this investigation. While it may be possible to summarize the technical conclusions from GSETT-2 during the next session of the Group, the full seismological evaluation will need considerably more time, and will be reported on later.

CONFERENCE ON DISARMAMENT

CD/1106
23 August 1991

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Report of the Ad Hoc Committee on a Nuclear Test Ban

I. INTRODUCTION

1. At its 582nd plenary meeting on 14 February 1991, the Conference on Disarmament adopted the following decision on the re-establishment of an ad hoc committee under item 1 of its agenda entitled "Nuclear Test Ban" (CD/1060):

"In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final Document, the Conference on Disarmament decides to re-establish an Ad Hoc Committee under item 1 of its agenda entitled "Nuclear Test Ban".

The Conference requests the Ad Hoc Committee to initiate, as a first step towards achieving a nuclear test ban treaty, substantive work on specific and interrelated test ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad Hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad Hoc Committee to examine the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test ban treaty. The Ad Hoc Committee will also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1991 session."

II. ORGANIZATION OF WORK AND DOCUMENTATION

2. At that same plenary meeting on 14 February 1991, the Conference on Disarmament appointed Ambassador I.S. Chadha of India as Chairman of the Ad Hoc Committee. Mr. Michael Cassandra of the United Nations Department of Disarmament Affairs served as Secretary.
3. A delegation of a nuclear weapon State did not participate in the work of the Ad Hoc Committee. A number of delegations regretted this absence and expressed the hope that it would reconsider its position at an early date.
4. The Ad Hoc Committee held 17 meetings from 21 February to 22 August 1991. In addition, the Chairman conducted a number of informal consultations with delegations.
5. At their request, the representatives of the following 24 States not Members of the Conference were invited to participate in the work of the Ad Hoc Committee: Angola, Austria, Cameroon, Chile, Colombia, Costa Rica, Denmark, Finland, Greece, Holy See, Ireland, Jordan, Malaysia, New Zealand, Norway, Oman, Spain, Switzerland, Syrian Arab Republic, Turkey, United Arab Emirates, Uruguay, Vietnam and Zimbabwe.
6. The following official documents dealing with a nuclear test ban were presented to the Conference:
 - CD/1054, dated 4 February 1991, submitted by Indonesia, Mexico, Peru, Venezuela, Yugoslavia and Sri Lanka entitled "Letter dated 4 February 1991 from the Representatives of Indonesia, Mexico, Peru, Venezuela, Yugoslavia and Sri Lanka addressed to the President of the Conference on Disarmament transmitting Draft Protocol II of Amendment to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water."
 - CD/1060, dated 14 February 1991, entitled "Mandate for an ad hoc committee under agenda item 1."
 - CD/1066, dated 8 March 1991, submitted by the delegation of the United States, entitled "Letter dated 28 February 1991 from the Representative of the United States of America addressed to the President of the Conference on Disarmament transmitting the text of the 1974 Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, together with its Protocol."
 - CD/1067, dated 8 March 1991, submitted by the delegation of the United States, entitled "Letter dated 28 February 1991 from the Representative of the United States of America addressed to the President of the Conference on Disarmament transmitting the text of the 1976 Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, together with its Protocol."
 - CD/1068, dated 8 March 1991, submitted by the delegation of the Union of the Soviet Socialist Republics, entitled "Letter dated 28 February 1991 from the Representative of the Union of Soviet Socialist Republics addressed to the President of the Conference on Disarmament transmitting the text of the 1974 Treaty between the Union of Soviet Socialist Republics and the United States of America on the Limitation of Underground Nuclear Weapon Tests, together with the Protocol thereto."

- CD/1069, dated 8 March 1991, submitted by the delegation of the Union of the Soviet Socialist Republics, entitled "Letter dated 28 February 1991 from the Representative of the Union of Soviet Socialist Republics addressed to the President of the Conference on Disarmament transmitting the text of the 1976 Treaty between the Union of Soviet Socialist Republics and the United States of America on Underground Nuclear Explosions for Peaceful Purposes, together with the Protocol thereto."
- CD/1081, (also issued as CD/NTB/WP.13), dated 11 June 1991, submitted by the delegations of Australia and New Zealand, entitled "Verification of a Comprehensive Test Ban."
- CD/1089, (also issued as CD/NTB/WP.14), dated 31 July 1991, submitted by the delegation of Sweden, entitled "Letter dated 9 July 1991 from the Head of the Swedish Delegation addressed to the Secretary-General of the Conference on Disarmament transmitting the text of a Draft Comprehensive Test-Ban Treaty and its annexed Protocols."
- CD/1094, dated 7 August 1991, submitted by the delegation of Canada, entitled "Letter dated 2 August 1991 from the Permanent Representative of Canada addressed to the Secretary-General of the Conference on Disarmament transmitting the Arms Control Verification Occasional Paper No. 8, entitled 'Nuclear Test Ban Verification: Recent Canadian Research in Forensic Seismology'."

In addition, the following working papers were presented to the Ad Hoc Committee:

- CD/NTB/WP.13 (also issued as CD/1081).
- CD/NTB/WP.14 (also issued as CD/1089).

The following conference room papers were before the Ad Hoc Committee:

- CD/NTB/CRP.9, dated 25 February 1991, entitled "Indicative Schedule of Meetings".
- CD/NTB/CRP.10, dated 12 March 1991, submitted by the delegation of Mexico, entitled "Working paper on the link between the provisions of the NPT regarding nuclear disarmament measures and those regarding the review conferences and the limited duration of the Treaty."
- CD/NTB/CRP.11/Rev.1, dated 16 May 1991, submitted by the Chair, entitled "Chairman's Summary of General Debate."
- CD/NTB/CRP.12, dated 31 May 1991, prepared by the Secretariat, entitled "Composite Paper containing elements of Multilateral Treaties relating to Nuclear Explosions for Peaceful Purposes (PNES)."
- CD/NTB/CRP.13, dated 13 June 1991, submitted by the Chair, entitled "Chairman's Summary on Structure and Scope."
- CD/NTB/CRP.14/Rev.1, dated 6 August 1991, submitted by the Chair, entitled "Chairman's Summary on Verification and Compliance."
- CD/NTB/CRP.15/Rev.2, dated 20 August 1991, entitled "Draft Report of the Ad Hoc Committee on a Nuclear Test Ban."

Furthermore, upon the request of the Ad Hoc Committee, the Secretariat compiled a paper containing the three Terms of reference of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events (CD/NTB/INFORMAL of 11 June 1991).

III. SUBSTANTIVE WORK DURING THE 1991 SESSION

7. At its first meeting on 21 February 1991, the Ad Hoc Committee decided to organize its work based on the items contained in its mandate. The matrix prepared by the Chairman of the Ad Hoc Committee in 1990 served as an unofficial guide to discussions throughout the session. A same number of meetings were devoted to the following three items: general debate; structure and scope; and verification and compliance (see Indicative Schedule of Meetings, CD/NTB/CRP.9). Furthermore, in accordance with its mandate, to also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events, the Ad Hoc Committee invited the Ad Hoc Group to a meeting on 1 August 1991.

8. The report is structured along the lines agreed by the Ad Hoc Committee in its division of labour and views of delegations are reflected under the three main items considered. In order to assist the Ad Hoc Committee, and strictly on his own behalf, the Chairman presented summaries of the debates on the three main topics (see CD/NTB/CRP.11/Rev.1, CRP.13 and CRP.14/Rev.1). These summaries were neither endorsed nor discussed by the Ad Hoc Committee.

9. The work of the Ad Hoc Committee took place in the light of the many views that had been expressed in plenary meetings of the Conference throughout the 1991 session as contained in its official records.

General Debate

10. Many views were expressed on general issues related to a nuclear test ban both during the four meetings the Ad Hoc Committee devoted to general debate and throughout the remaining meetings. The comments made during the general debate on structure and scope and verification and compliance are summarized under their respective sections below. The exchange of views underlined the importance all delegations attached to multilateral consideration of a nuclear test ban. It was also welcomed as useful in laying the groundwork for the further consideration of the other two clusters of items that were taken up, namely, structure and scope; and verification and compliance.

11. The early re-establishment of the Ad Hoc Committee in 1991 was welcomed by all delegations as it gave ample opportunity for delegations to address the many political and technical issues of relevance to a nuclear test ban.

12. The Group of 21 continued to stress the need for the Ad Hoc Committee to be provided with a negotiating mandate. One delegation of the same group stated that it had joined the consensus for the re-establishment of the Ad Hoc Committee with a non-negotiating mandate only for 1991 and that if the Ad Hoc Committee was not provided with a negotiating mandate next year, it would be pointless to carry on a sterile exercise. Delegations of the Western group maintained that the current mandate of the Ad Hoc Committee allowed for genuine progress on the issues of a nuclear test ban.

13. There continued to be a general acceptance of the final goal of a nuclear test ban. However, differences remained on its timing and modalities. Many delegations of the Group of 21 stressed again that for them a nuclear test ban remained an absolute priority to halt the quantitative and especially the qualitative arms race, since they believed it would prevent the development of a new generation of nuclear weapons. For delegations of the Western group, a nuclear test ban remained a long-term goal and had to be seen in the context of the wider disarmament process. They pointed out that even without a nuclear test ban, at least two nuclear weapon States had begun a process of quantitative nuclear disarmament, viz., the INF Treaty and the cuts to be enacted under the START Treaty. It was clear to the delegations of the Group of 21 that what they considered a justified fear of the devastating consequences of the use of nuclear weapons had encouraged many States to advocate a halt to nuclear weapon tests. They pointed out that the achievement of a nuclear test ban was only a partial measure in the overall goal of complete nuclear disarmament, and its importance could not be belittled in this context. They added, however, their belief that cuts envisaged under START could actually lead to the modernisation of existing nuclear arsenals.

14. Many references were made to the recent political changes that have taken place in the world. Many delegations stated that the improved international climate held opportunities in the field of nuclear disarmament which should not be squandered. The INF Treaty and the recent signature of the START Treaty were encouraging signs of deep changes in this field. In the area of nuclear testing, many delegations welcomed the ratification of the USSR/United States Threshold Test Ban Treaty (TTBT) and the Peaceful Nuclear Explosions Treaty (PNET). Some delegations called upon the USSR and United States to continue the phased process of negotiations towards reducing the yield and number of their nuclear tests. The call to the two bilateral negotiators to continue the practice of providing the Conference on Disarmament with information on the status of their plans for future negotiations was reiterated.

15. Delegations of the Group of 21 recalled the numerous resolutions of the General Assembly adopted by overwhelming majorities over many years calling for an immediate halt to nuclear testing. They also recalled the many initiatives over the years on the subject, including the Six-Nation Initiative of 1986, which presented, in their view, a concrete offer for the adequate verification of a nuclear test ban. Many delegations of the Group of 21 stated that the convening in 1991, upon the request of one-third of the States Parties, of the first substantive session of the Amendment Conference of the Partial Test Ban Treaty also was an expression of the urgency attached to the achievement of a nuclear test ban by a vast majority of the international community. Some delegations of the Group of 21 suggested that the lack of agreement on a final declaration at the 1990 Fourth Review Conference of the Non-Proliferation Treaty was also a reflection of the concern of the majority of the States Party to that Treaty over the lack of progress towards the achievement of a nuclear test ban.

16. The security implications of nuclear testing were discussed, with particular emphasis on its relationship to nuclear deterrence. The NATO Declaration made in London in 1990 (see CD/1013) to the effect that the Alliance would reduce its reliance on nuclear weapons was recalled by those members of the Western group concerned. They stated that the NATO Alliance was reviewing its policy with respect to nuclear weapons, but that, for the

foreseeable future, NATO security would depend in part on such weapons. For that reason, NATO States continued to see a requirement to conduct tests to keep nuclear weapons safe, secure, reliable and up-to-date. It was also felt that prospects to reduce nuclear weapons to a minimum were good and that a concomitant reduction of nuclear tests to a minimum would follow. In this context, support for the step-by-step approach for the realization of a comprehensive test ban was again reiterated by delegations of the Western group of States.

17. In this context, most Western delegations committed themselves to the step-by-step approach, as a realistic approach for the achievement of a comprehensive nuclear test ban. They considered that the ratification of the TTBT and PNET together with the new verification Protocols represented an important step towards this goal and a partial fulfilment of this commitment. In their view, the step-by-step approach should reduce the quantity and yield of nuclear testing still further whenever political and technical conditions so allowed. They felt that it should be recognized that the Western nuclear powers already kept their nuclear test programmes to the minimum necessary to meet national security requirements and that, as a consequence, the overall number of nuclear explosions between 1983 and 1990 had already decreased to one-third of the initial level.

18. A nuclear weapon State belonging to the East European group expressed a continued commitment to the early achievement of a comprehensive test ban as not only a measure to curb the nuclear arms race, but an important means of promoting non-proliferation of nuclear weapons as well. Based on this assessment of the importance of the role of a nuclear test ban in world affairs, it was prepared to use all possible ways and means in order to reach its early resolution - be it through bilateral negotiations or multilateral efforts, through widening the scope of the 1963 Moscow Treaty or through a joint declaration together with the major nuclear weapon State belonging to the Western group on a nuclear tests moratorium. It held the view that a step-by-step approach to the achievement of a comprehensive ban was justifiable. It pointed to that approach in its bilateral negotiations on nuclear testing with the major nuclear weapon State belonging to the Western group and stressed that the first goal of those negotiations had been reached with the ratification of the Threshold Test Ban Treaty of 1974 and the Peaceful Nuclear Explosions Treaty of 1976 and their attached Protocols. It underlined support for a continuation of negotiations to consider further limitations on the quantity and yield of nuclear tests. It restated its conviction that a final resolution of the problem of stopping nuclear tests required focusing the efforts of the relevant multilateral bodies as well. In its view, bilateral and multilateral efforts may and should complement each other. It was of the opinion that such a representative forum as the Conference on Disarmament would also make its tangible contribution to the solution of this problem through its Ad Hoc Committee. It also considered that Draft Protocol II of Amendment to the PTBT and the submission of the revised Draft Comprehensive Test Ban Treaty by one delegation belonging to the Group of 21 as important steps towards a nuclear test ban.

19. A nuclear weapon State member of the Western Group reaffirmed that nuclear weapons continued to play a critical role in its national security strategy, as well as in the national security strategies of its allies. So long as this is the case, it stated that it must be free to conduct nuclear tests to ensure the safety and credibility of its forces. While a CTB remained a long-term objective, it believed that such a ban must be viewed in the context of a time when States do not need to depend on nuclear deterrence

to ensure international security and stability. It held that when broad, deep, and effectively verifiable arms reductions, substantially improved verification capabilities, expanded confidence-building measures, and greater balance in conventional forces was achieved, a CTBT could be attainable. This State believed that the best way to address the threat posed by nuclear weapons and to further the aims of nuclear arms control was through the reduction of nuclear weapons. It maintained that the the recent signing of the START Treaty represented a major achievement in securing a more stable, predictable balance at lower levels of nuclear force. It noted that the agreement included a major reduction in the most destabilizing and dangerous weapons, land-based ballistic missiles and their warheads, and placed restrictions on specific types of strategic weapons and that a further important aspect of the START Treaty was its contribution to increasing predictability and transparency. It believed that unlike the START Treaty, a CTB would not result in any reduction in existing arsenals, nor deal with the threat posed by nuclear weapons. It pointed out that contrary to the beliefs of some, even the most effective seismic monitoring system was only one element of effective verification. It reaffirmed that the question should be dealt with on the basis of a step-by-step approach. It welcomed the re-establishment of the Ad Hoc Committee with a non-negotiating mandate, and stressed that it would contribute fully as well as share the results of its research in relevant technologies.

20. Another nuclear weapon State belonging to the Western group stated that it undertook nuclear tests because, with its NATO Allies, it believed that war was best prevented by keeping a sensible mix of conventional and nuclear weapons which would present any possible aggressor with risks out of proportion to any possible gain. Its nuclear forces represented the minimum required for preventing war; to be a sure deterrent, they must be kept effective and up-to-date and for the present that required testing. It therefore supported a comprehensive ban on all nuclear tests only as a long-term goal.

21. Yet another nuclear weapon State not belonging to any group restated that it understood the urgent desire of the Third World countries and the non-nuclear-weapon States for a nuclear test ban at an early date. It reiterated the importance that it attached to the issue of a nuclear test ban in the context of its continued stand in favour of the complete prohibition and thorough destruction of all nuclear weapons. It again repeated that in order to stop the nuclear arms race and achieve nuclear disarmament, the two States possessing the largest nuclear arsenals should take the lead in halting the development, production and deployment of all nuclear weapons and drastically reducing their nuclear arsenals. It welcomed the constructive discussions in the Ad Hoc Committee, in which it would continue to participate and take an active part.

22. The Group of 21 delegations expressed the view that since the Cold War had ended and in the light of some of the political and security changes underway in Europe, the reasons for reliance by some States on nuclear deterrence seemed no longer valid. The Group maintained the position that nuclear deterrence cannot ensure international security and stability, particularly in the context of the new positive international climate. A nuclear weapon State belonging to the Western Group said that the significance of nuclear weapons in its nuclear deterrence doctrine and that of its allies had evolved over the years in response to changing requirements. It stated that the collective thinking in the Atlantic Alliance about nuclear weapons had undergone a shift in response to the dramatic political and military

changes in Europe over the past two years. It pointed to the most recent evolution in their approach, the new strategy recorded in the London communiqué of 5-6 July 1990 (see CD/1013), in which nuclear forces would be truly weapons of last resort. It added that major developments cannot be predicted in today's world which is characterized by great uncertainty nor could future security requirements be predicted; political, economic, and social changes had unleashed forces whose effects were not foreseeable.

23. Delegations of the Group of 21 continued to stress that the central purpose of nuclear testing was the modernization of nuclear weapons. In particular, they felt that a comprehensive nuclear test ban would help to halt the next round of the vertical nuclear arms race, namely, the development of "third" generation weapons or "directed energy" weapons. They felt that, while horizontal proliferation was a hypothetical possibility, there were well-documented facts regarding vertical proliferation of nuclear warheads and infrastructures of the nuclear weapon States. They believed also that the spatial spread of arsenals and infrastructures to the high seas and the territories of countries far removed and the extension of at least the infrastructure to outer space had totally nuclearised the globe. They felt that a general acceptance had developed that a nuclear test ban would stem proliferation both vertically and horizontally and serve to fulfil genuine and universal non-proliferation concerns.

24. A nuclear weapon State belonging to the Western group held the view that a nuclear test ban would not be a guarantee against horizontal nuclear non-proliferation as it was possible that a first generation nuclear device could be developed without testing. Furthermore, it also held the view that, even without a halt to testing, the numbers of nuclear weapons were being reduced. It also questioned the statement that a halt to nuclear testing would stem the development of a "third" generation of nuclear weapons since, in its view, such a development would represent a quantum leap into new technology. It stated that nuclear non-proliferation was best addressed through regional cooperation in peaceful nuclear programmes as well as through effective international controls over nuclear weapons technology and materials.

25. Some delegations of the Group of 21, States Party to the NPT, reiterated the importance they attached to the strengthening of that Treaty. Comments were made on the results of the Fourth Review Conference of the Treaty held in 1990. They reiterated again the historical link between progress on nuclear disarmament and towards a nuclear test ban and the future extension of the Non-Proliferation Treaty beyond 1995, and the commitments made by nuclear weapon States were recalled in detail by delegations of the Group of 21. As a contribution to the discussion, a background paper on the historical link between nuclear disarmament measures and the extension of the Treaty was presented to the Ad Hoc Committee (see CD/NTB/CRP.10) by one delegation of the Group of 21. Some delegations of the Western group of States felt that the frustration experienced by some Parties to the Treaty over the question of a nuclear test ban, which was reflected in the inability of the Conference to adopt a final declaration, should be redressed by dialogue on the subject and not by confrontation. Some delegations of the Western Group of States stated that no such commitments as mentioned by the Group of 21 had been made and that there should be no link between a nuclear test ban and the extension of the Non-Proliferation Treaty.

26. The nuclear weapon States were asked whether they could provide a breakdown of data, based on published results, on their nuclear testing which would indicate separately the number of tests conducted/needed for development of weapons or for stockpile reliability. In response, they explained that a breakdown of data on nuclear testing could not be easily categorized.

27. The proposal in the Six-Nation Initiative for a moratorium on nuclear weapon testing pending the conclusion of a comprehensive test ban treaty was recalled by delegations of the Group of 21.
28. Views were expressed on the Amendment Conference to the 1963 Partial Test Ban Treaty which took place in January this year. It was felt by the Group of 21 delegations Party to the Partial Test Ban Treaty that developments from the Conference should be taken into account and, in particular, there should be a discussion on the Draft Protocol II on verification of the proposed amendment to the PTBT, presented to that Conference and subsequently to the Conference on Disarmament by Indonesia, Mexico, Peru, Sri Lanka, Venezuela and Yugoslavia in document CD/1054. Some comments made on the Draft Protocol are summarized under the Verification and Compliance section. It was stated by the Group of 21 delegations Party to the PTBT that progress in the Ad Hoc Committee would be a test of those delegations which had participated in the Amendment Conference and which had pledged their readiness to pursue a debate on a comprehensive test ban through the Conference on Disarmament.
29. Discussions also focused on the possible negative effects of nuclear testing on health and the environment. Many delegations, members and non-members of the Conference, expressed the view that recent reports pointed to concerns over environmental and health effects in regions where nuclear tests were carried out. In that connection, several references were made to the report of the United Nations Secretary General containing a comprehensive update of the Comprehensive Study on Nuclear Weapons (A/45/373) and other reports and articles. One delegation of a nuclear weapon State belonging to the Western group stated that the entry into force of the Partial Test Ban Treaty, and the adherence to its terms by two other nuclear weapon States to conduct underground tests, combined with the sophistication of technology for containing underground tests, had minimised concern over negative environmental effects. It referred to the 1989 Report of the United States Office of Technology Assessment, which explained that all its testing is performed under rigidly controlled conditions to minimise the potential impact of the tests on the environment and on public safety. The Group of 21 expressed the view that the goal of the Committee was not to seek clean nuclear underground tests and, therefore, environmental and health concerns related to underground testing should not take precedence over the political goal of a nuclear test ban treaty since the major objective of such a treaty was to prevent the production of a new generation of nuclear weapons.
30. One delegation of the Group of 21 put forward a draft Comprehensive Test-Ban Treaty (see CD/1089 and CD/NTB/WP.14), which was a revised and considerably extended version of a draft Treaty submitted by the same delegation in 1983 (CD/381). This delegation stated in the course of introducing its proposal that the new draft was put forward against a background of recent improvements in the international climate. It stressed that the General Assembly of the United Nations had year after year underscored the urgent need for a comprehensive nuclear test ban treaty. It maintained that an end to nuclear testing would be a clear manifestation of a genuine will to pursue nuclear disarmament and would be a way of curbing horizontal and vertical proliferation. It felt that there was also widespread concern about the collateral effects of nuclear testing. It stated that the draft submitted was intended as a basis for consideration in the Ad Hoc Committee and in due course as an input to negotiations. It underlined that the new draft had taken into account rapid scientific and technological developments. It pointed to the major changes had been

undertaken with regard to the Protocols, dealing with a verification system and organizational matters. It believed that technical achievements in the field of verification were such that effective international verification of a CTBT was possible. It also considered that given a political preparedness to conclude a CTBT, the effectiveness of the verification régime was largely a question of the amount of resources allocated for the purpose. It pointed to the measures contained in the draft Treaty, such as seismic monitoring, surveillance of airborne radioactivity, satellite observations and on-site inspection, aimed at establishing an effective verification system. It also pointed to the operational manuals the draft Treaty proposes to be established to guide the operation of the various components of the verification system. It also described the proposed Organization of the draft Treaty, which was to oversee the overall functioning of the Treaty and its verification arrangements: it was proposed to consist of the Conference of the States Parties as the principal organ; the Executive Council as the executive organ of the Conference to promote the practical implementation and operation of the Treaty and its verification arrangements; and a Technical Secretariat to conduct the day-to-day operation of the Treaty. The Ad Hoc Committee offered preliminary comments on this document. A number of delegations welcomed the proposal as an important contribution to the future work of the Ad Hoc Committee. One Western nuclear weapon State questioned whether the scope and the definition of a nuclear weapon State contained in the draft treaty effectively addressed the concerns raised in the Ad Hoc Committee. Other delegations stated that if a definition were to be attempted there would always be a possibility of a certain category being excluded which would be detrimental to the treaty in the future. As to the issue of a definition of a nuclear weapon State, those delegations also stated that another relevant Treaty already contained such a definition, which was why it was retained in the draft Treaty presented.

Structure and Scope

31. For delegations of the Group of 21, "Structure" meant dealing with the following elements, inter alia:

- Preamble
- Scope
- Verification
- Compliance
- Organization.

Furthermore, they felt that these elements were interrelated and should be dealt with as such. Provisions of existing multilateral and bilateral instruments could be taken into account for this purpose. It was mentioned that the structure could consist of three basic elements, namely, the scope of the instrument as such, the link between States Parties to the instrument and consistency with the verification system for the treaty, matters relating to the duration of the instrument as well as the question of the depository. The possibility of up-dating the structures of the treaty in tune with developing needs was advanced.

32. Delegations belonging to the Western group stated that the structure of a future nuclear test ban treaty was part and parcel of negotiations on a nuclear test ban. Hence, they reiterated that it was inappropriate to discuss this question at the stage which the Ad Hoc Committee had reached in its discussions. However, they underscored that the Ad Hoc Committee could consider the various elements that would form a part of eventual negotiations on the subject.

33. As to the scope of a future nuclear test ban treaty, some delegations of the Group of 21 stated that it was clearly spelt out in the Preamble of the Partial Test Ban Treaty of 1963 and should contain the following three elements:

- i) it should cover all States including the five existing nuclear weapon States;
- ii) it should extend the prohibition on testing of nuclear weapons to the underground environment;
- iii) it should do so for all time.

Reference was made to the agreement contained in the Trilateral Negotiators Report of 1980 (CD/130 of 30 July 1980) with respect to the scope of a future nuclear test ban treaty. Some delegations belonging to the Group of 21 stated that during the earlier consideration of a comprehensive test ban treaty, peaceful nuclear explosions had always been assigned a separate role. Also, the original intention of the PTBT clearly was to maintain a dividing line between nuclear explosions for military purposes, which were to be prohibited entirely and nuclear explosions for peaceful purposes, to be allowed under certain conditions. All the existing international agreements which referred to nuclear tests contained separate provisions for peaceful nuclear explosions. These delegations expressed the view that the scope of a future treaty should be consistent with what the Preamble of the PTBT seeks to achieve and to ensure that the majority of nations were not denied the full benefits of technological advancement in the nuclear field, while a handful of States were left free to do so. The interests of the non-nuclear weapon States had to be taken into account on the basis of complete equality with the interests of the nuclear weapon States. In this context the provisions contained in the Treaty of Tlatelolco, and the Threshold Test Ban Treaty and Peaceful Nuclear Explosions Treaty, suggesting differentiation between nuclear explosions for military purposes and peaceful nuclear explosions, were specifically recalled by some delegations of the Group of 21. Another delegation of this Group stated that with regard to the Structure and Scope, as to what a CTBT could be, in principle, it should be total, but it should not close the door definitively to possible peaceful use if this is seen to be necessary in proper environmental and security conditions that would not harm the position of any State.

34. Delegations belonging to the Western Group of States underlined that the technology for a peaceful nuclear explosion was indistinguishable from an explosion for military purposes. They discussed at length the early optimism which existed on the potential uses of nuclear explosions for peaceful purposes and described the large number of explosions that were conducted to try and demonstrate their feasibility. The conclusions reached by them were that peaceful nuclear explosions were not economically nor environmentally feasible. They pointed out that peaceful nuclear explosives were sophisticated and that the physics, technical know-how, and nuclear materials required were quite similar to those required for military nuclear explosives, in that size, compactness, and rugged designs were stated goals for both peaceful and military explosives. They brought to the Ad Hoc Committee's attention the conclusions reached by many experts including those from the United Nations Comprehensive Study on Nuclear Weapons (A/45/373) which concluded that five major arms limitation and disarmament treaties attest to the similarity of nuclear explosive devices for military and for peaceful purposes.

35. It was suggested by some delegations belonging to the Western group that the Ad Hoc Committee might need to elaborate the definition of a nuclear explosion, with the advice of technical experts. Several delegations belonging to the Group of 21, however, pointed to the complexities involved in the possible development of an agreed definition of nuclear explosions. They stated that if a definition was attempted, there would always be the possibility of a certain category being omitted, which could cause difficulty for the treaty régime at a later date, and that it was not necessary to do so. Some delegations of the Western Group of States stated that a definition of a nuclear explosion was critical to the discussion on the nuclear test ban issue. The questions of computer simulations, laboratory tests and contained nuclear explosions were also discussed. In this respect, a delegation of the Group of 21 stressed the importance of peaceful nuclear explosions and their technical and economic value and the need to keep open in any multilateral agreement the utilization of computer simulations, laboratory tests and contained nuclear explosions.

36. It was suggested by some delegations belonging to the Group of 21 as well as to the Western group that the question of agreeing on the lowest verifiable limit, i.e. threshold of nuclear explosions, be taken up. The view was expressed that this issue was directly linked to the consideration of verification of a nuclear test ban. It was suggested in this context by some delegations of the Group of 21 that even a one kiloton threshold would seriously impair the development of a third generation of nuclear weapons. One delegation presented examples of what could be achieved in the laboratories below the one kiloton threshold. It stated that the Ad Hoc Committee had also to take into account other research programmes like the Inertial Confinement Fusion Programme and the sensitivity of that technology. In this context, the research relating to the x-ray laser, nuclear kinetic energy weapons, optical laser, microwave beams as well as particle beams was referred to. Some delegations of the Group of 21 suggested that technical advice could be obtained from the Ad Hoc Group of Scientific Experts on the verifiability of certain thresholds for a nuclear test ban treaty.

Verification and Compliance

37. Divergent views were expressed by delegations as to whether all the technical pre-requisites were available today to effectively verify a total test ban. While acknowledging the technical aspects of the issue, many delegations of the Group of 21 believed that the resolution of the issue of verification was rather political in nature. They noted that the ongoing work of the Ad Hoc Group of Scientific Experts has provided concrete evidence that a nuclear test ban was verifiable using technology currently available. Other delegations stressed that there are many detailed, technical issues that still needed to be resolved for an effective global monitoring of a nuclear test ban.

38. A nuclear weapon State of the Western group suggested that the Ad Hoc Committee consider the means that currently exist to verify the 1974 Threshold Test Ban Treaty and the 1976 Peaceful Nuclear Explosions Treaty compared with what would be required to verify effectively a comprehensive nuclear test ban treaty. It underlined that verification Protocols to the TTBT and PNET took almost three years of intensive bilateral negotiations. It recommended that delegations examine these lengthy and complex technical Protocols which were distributed as official documents to the Conference as CD/1066 and CD/1067, respectively. It stated that the Protocols were unprecedented in nature and

complexity, and noted that the provisions in these Protocols still had to be implemented. It stressed that the task of verifying the TTBT would be minor compared to verification of a CTBT. It stated that verification of the TTBT required an extensive on-site presence, deployment of a highly sophisticated and complex array of instrumentation, and detailed knowledge of the test location and its geological environment. It underscored that verification of a CTBT, on the other hand, would involve global rather than local monitoring and analysis of any and all measurable explosions or disturbances. It added that this would be followed by the complex task of screening to distinguish nuclear test explosions from earthquakes, chemical explosions, and other phenomena. Based on this State's analysis, the means did not currently exist to verify a CTBT adequately. It stated that such a programme of verification would dwarf the current TTBT régime in terms of scale and complexity.

39. The starting point for the debate was the question of the scope of an eventual agreement, specifically, the levels of the yield of explosions that could be agreed in order to create political confidence that a ban was being complied with. Delegations of the Western group of States held that this aspect depended upon politico/military decisions of States with respect to their national security concerns. Differing views continued to be expressed as to what should be the yields of explosions that would allow for not only their detection but also for their identification as nuclear explosions. Some delegations of the Western group expressed the view that there still existed possible evasion techniques, such as, cavity decoupling and the masking of explosions during earthquakes, the verification methods for which could not yet give full confidence. The Group of 21 delegations maintained that such techniques tended toward the impractical, that these types of explosions would eventually be detectable by non-seismic means and that it was also impractical to work for a 100% foolproof verification system. One delegation belonging to the Western group and one delegation non-member of the Conference, in their working paper (CD/NTB/WP.13), mentioned that the technology to attempt such evasions was unlikely to be available outside the existing nuclear weapon States, and the risk of detection would be extremely high and would increase with each test. These two delegations maintained that attempts to evade a nuclear test ban would be confined to a level at which the military advantages to be gained from clandestine explosions would be minimal and the chances of escaping detection would be extremely low.

40. Some delegations of the Western group suggested a step-by-step approach which would gradually reduce the threshold levels of explosions at successively verifiable levels, as a way of ensuring confidence in a global test ban. A number of States of the Group of 21 expressed the view that even a one kiloton ceiling would seriously impede the development of a new generation of nuclear weapons. This would curtail, in their view, the qualitative 'improvements' in nuclear weapons and render further refinements in the size, yield or yield to weight ratio of nuclear weapons nearly impossible. They also maintained that it would reduce the likelihood that potential 'first' strike weapons would be built. Also raised was the issue of laboratory or contained tests at very low yields and whether new verification techniques would need to be developed in order to deal with them. Some delegations of the Group of 21 stated that while laboratory research and development of new weapons designs might continue, the inability to test the performance of new designs would inhibit States from accepting such weapons into their arsenals. They added that gradually the verification régime of a nuclear test ban treaty could be made more comprehensive and foolproof. A nuclear weapon State of the Western group asserted that a one

kiloton explosion could still provide valuable nuclear weapons development information. The same State added that, even if a one kiloton threshold were ever to be achieved, this would not be effective in precluding the development of nuclear weapons.

41. Some issues involved with nuclear testing in other environments besides underground were raised by some delegations of the Western group. Comments were made on the feasibility of verification of nuclear tests if they were conducted in outer space, in the atmosphere or under water. A suggestion was made by one delegation of the Western group that feasibility studies might be conducted in this regard. The importance of seismic means of verification was stressed once again and it was pointed out that a strong capability in the seismic verification field was already available and could be improved further. Views were aired by delegations of all groups that non-seismic means of verification would also be required in order to adequately monitor an eventual nuclear test ban. Methods such as radio-active surveillance of the atmosphere, hydro-acoustic monitoring, satellite photo-imaging and on-site inspections were cited. It was stated that an eventual combination of these means could provide a reliable verification system.

42. It was felt by many delegations that the Ad Hoc Committee should take up the issue of the future activities of the Ad Hoc Group of Scientific Experts To Consider International Cooperative Measures to Detect and Identify Seismic Events after the Ad Hoc Group presents a report on its second major technical test (GSETT-2) during the 1992 session. Differing views were expressed on the mandate of the Ad Hoc Group and on the future directions the Ad Hoc Group could take. It was recalled that any changes in the mandate of the Ad Hoc Group were in the purview of the Conference on Disarmament. Many views were aired about the possible future tasks of the Ad Hoc Group within the existing or a revised mandate: inter alia; the design of a system with one International Data Centre (IDC) and not four; the preparation of preliminary operational manuals; further research on use of waveforms at IDCS; the establishment of in-country stations; the estimated capabilities of a global seismic monitoring system. Other techniques were also mentioned: the monitoring of atmospheric radioactive nucleides; on-site inspections, on-site monitoring of large non-nuclear explosions and satellite images interpretation. Other views were aired that the Ad Hoc Group was not the group to make recommendations on future work in areas other than seismic and that further discussion was needed within the Ad Hoc Committee on how non-seismic technical verification issues should be handled. It was suggested by some delegations that the Ad Hoc Committee worked in parallel with the Ad Hoc Group and recommendations for the future work of the Ad Hoc Group needed to come both from the Ad Hoc Group itself and from the Ad Hoc Committee, as two distinct organs of the Conference, working towards the same goal.

43. Some views were expressed concerning the institutional arrangements that would need to be made in connection with a verification régime. Some delegations of the Western group were of the view that a discussion of institutional arrangements was still premature in light of the need to agree on the scope of a nuclear test ban agreement and the related verification requirements. Some specific proposals were put forward and were commented upon. Some delegations of the Group of 21 felt that national data centres, already elaborated upon by the Ad Hoc Group of Seismic Experts, could perform a multitude of technical functions and procedures, and could therefore serve as a basis for a national body which would also handle political aspects such as complaints and on-site verification.

44. Some comments were made on the Draft Protocol II of Amendment to the Partial Test Ban Treaty. They concerned: terminology and definitions; the functions and structure of the Secretariat; an operational governing body; more detailed non-seismic verification; aspects of the inspection procedures; the establishment of different monitoring thresholds for different Parties to the agreement; cost-effectiveness of the proposed institutions; and the specific application of provisions for States Parties. The six co-sponsors of the PTBT Amendment Conference initiative indicated that they had been encouraged by the discussion in the Ad Hoc Committee of Draft Protocol II on verification and compliance and stated that parallel verification mechanisms with respect to each of the possible environments would create a costly and imbalanced verification régime, and such a subdivision could only be undertaken, provided there is agreement on the required level of verification with respect to environments other than underground. They were ready to consider the suggestion to broaden the mandate of the Ad Hoc Group of Scientific Experts in order to encompass other verification methods. They stated that the work of the Ad Hoc Committee and the process of achieving a comprehensive test ban treaty through the amendment of the 1963 Partial Test Ban Treaty should complement each other. A number of Western delegations expressed clear reservations about some aspects of Draft Protocol II. They were concerned in particular about the threshold for verification, adequacy of seismic array, the on-site inspection provision and the role and composition of the Secretariat.

IV. CONCLUSIONS AND RECOMMENDATIONS

45. It was generally recognized that discussions held in the Ad Hoc Committee this year had touched upon the major issues of a nuclear test ban in considerable detail. The debate was considered useful in preparing the ground for future in-depth consideration of the issues reflected in this report.

46. The Ad Hoc Committee noted with appreciation the participation of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events at a meeting of the Committee. The ongoing work of the Ad Hoc Group was commended and it was felt that the results of the second major technical experiment recently concluded by the Ad Hoc Group, (GSETT-2), would make an important contribution to the issues addressed by the Ad Hoc Committee on seismic verification mechanisms.

47. The Ad Hoc Committee agreed that substantive work on agenda item 1 should continue at the 1992 session of the Conference and, accordingly, recommended that it should be re-established at the beginning of the 1992 session.

CONFERENCE ON DISARMAMENT

CD/1106/Corr.1
3 September 1991

Original: ENGLISH

REPORT OF THE AD HOC COMMITTEE ON A NUCLEAR TEST BAN

CORRIGENDUM

1. Page 4, paragraph 8, line 1: 'Committe' to read 'Committee'.
2. Page 6, paragraph 18, line 1 should read: 'A nuclear weapon State belonging to the group of East European and other States expressed a continued...'
3. Page 7, paragraph 19, five lines up from bottom of paragraph should read: 'It reaffirmed that the question of a nuclear test ban should be dealt with on the basis ...'.
4. Page 9, paragraph 29, eight lines up from the bottom of paragraph should read: 'Office of Technology Assessment, which stated that all the United States' testing is performed ...'.
5. Page 9, paragraph 30, bottom line should read: 'It pointed to the major changes that had been...'



General Assembly

Distr.
GENERAL

A/RES/46/28
20 December 1991

Forty-sixth session
Agenda item 52

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/46/665)]

46/28. Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water

The General Assembly,

Recalling its resolutions 44/106 of 15 December 1989 and 45/50 of 4 December 1990,

Reiterating its conviction that a comprehensive nuclear-test-ban treaty is the highest-priority measure for the cessation of the nuclear arms race and for the achievement of the objective of nuclear disarmament,

Recalling also the central role of the United Nations in the field of nuclear disarmament and in particular in the cessation of all nuclear-test explosions, as well as the persistent efforts of non-governmental organizations in the achievement of a comprehensive nuclear-test-ban treaty,

Conscious of the growing environmental concerns throughout the world and of the past and potential negative effects of nuclear testing on the environment,

Recalling its resolution 1910 (XVIII) of 27 November 1963, in which it noted with approval the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, 1/ signed on 5 August 1963, and requested the Conference of the Eighteen-Nation Committee on Disarmament 2/ to continue with a sense of urgency its negotiations to achieve the objectives set forth in the preamble to the Treaty,

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ The Committee on Disarmament was redesignated the Conference on Disarmament as from 7 February 1984.

/...

Recalling also that more than one third of the parties to the Treaty requested the Depositary Governments to convene a conference to consider an amendment that would convert the Treaty into a comprehensive test-ban treaty,

Reiterating its conviction that the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water will facilitate the attainment of the objectives set forth in the Treaty and thus serve to strengthen it,

Recalling further its recommendation that arrangements be made to ensure that intensive efforts continue, under the auspices of the Amendment Conference, until a comprehensive nuclear-test-ban treaty is achieved,

1. Notes with satisfaction that a substantive session of the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water was held in New York from 7 to 18 January 1991, and takes note of its report; 3/

2. Takes note of the decision adopted by the Amendment Conference 4/ to the effect that, since further work needed to be undertaken on certain aspects of a comprehensive test-ban treaty, especially those with regard to verification of compliance and possible sanctions against non-compliance, the President of the Conference should conduct consultations with a view to achieving progress on those issues and to resuming the work of the Conference at an appropriate time;

3. Welcomes the ongoing consultations being conducted by the President of the Amendment Conference and the holding in 1992 of more structured open-ended consultations, as well as the establishment of a group of friends of the President in order to examine various aspects of a comprehensive nuclear-test ban, with a view to resuming the work of the Conference as soon as possible thereafter;

4. Calls upon all parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water to participate in, and to contribute to the success of, the Amendment Conference for the achievement of a comprehensive nuclear-test ban at an early date, as an indispensable measure towards implementation of their undertakings in the preamble to the Treaty;

5. Urges all States, especially those nuclear-weapon States which have not yet done so, to adhere to the Treaty;

6. Recommends that arrangements should be made to ensure the fullest possible participation of non-governmental organizations in the Amendment Conference;

7. Reiterates its conviction that, pending the conclusion of a comprehensive nuclear-test-ban treaty, the nuclear-weapon States should suspend all nuclear-test explosions through an agreed moratorium or unilateral moratoria;

3/ PTBT/CONF/13/Rev.1.

4/ Ibid., para.26.

8. Stresses once again the importance of ensuring adequate coordination among the various negotiating forums dealing with a comprehensive nuclear-test-ban treaty;

9. Decides to include in the provisional agenda of its forty-seventh session the item entitled "Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water".

65th plenary meeting
6 December 1991



General Assembly

Distr.
GENERAL

A/RES/46/29
27 December 1991

Forty-sixth session
Agenda items 51 and 53

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/46/666)]

46/29. Comprehensive nuclear-test-ban treaty

The General Assembly,

Recalling previous resolutions which identify the complete cessation of nuclear-weapon tests and a comprehensive test ban as one of the basic objectives in the field of disarmament,

Convinced that a nuclear war cannot be won and must never be fought,

Welcoming the improved relationship between the Union of Soviet Socialist Republics and the United States of America and their consequent announcements of significant measures, including unilateral steps, which could signal the reversal of the nuclear arms race,

Welcoming also the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, signed on 31 July 1991, and expressing the hope that it will be followed by agreement at an early date on further cuts in strategic nuclear arsenals,

Recognizing the ratification of the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Underground Nuclear Weapon Tests, 1/ signed on 3 July 1974, and the Treaty between the United States of America and the Union of Soviet Socialist Republics on Underground Nuclear Explosions for Peaceful Purposes, 2/ signed on 28 May 1976, together with their protocols,

1/ Official Records of the General Assembly, Twenty-ninth Session, Supplement No. 27 (A/9627), annex II, document CCD/431.

2/ The United Nations Disarmament Yearbook, vol. I: 1976 (United Nations publication, Sales No. E.77.IX.2), appendix III.

/...

Noting the decline, in comparison with previous years, in the number of nuclear tests conducted in 1990,

Convinced that an end to nuclear testing by all States in all environments for all time is an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation and to contribute, along with other concurrent efforts to reduce nuclear arms, to the eventual elimination of nuclear weapons,

Noting also concerns expressed about the environmental and health risks associated with underground nuclear testing,

Convinced also that the most effective way to achieve an end to nuclear testing is through the conclusion, at an early date, of a verifiable, comprehensive nuclear-test-ban treaty that will attract the adherence of all States,

Taking into account the undertakings by the original parties to the 1963 Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water 3/ to seek to achieve the early discontinuance of all test explosions of nuclear weapons for all time and also noting the reiteration of this commitment in the 1968 Treaty on the Non-Proliferation of Nuclear Weapons, 4/

Noting with satisfaction the work being undertaken within the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, and in this context welcoming the second technical test concerning the global exchange and analysis of seismic data,

Recalling that the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water was held in New York from 7 to 18 January 1991,

1. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States in all environments for all time is a matter of priority which would constitute an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation, and which would contribute to the process of nuclear disarmament;

2. Urges, therefore, all States to seek to achieve the early discontinuance of all nuclear-test explosions for all time;

3. Reaffirms the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty, and in this context urges the re-establishment of the Ad Hoc Committee on a Nuclear Test Ban in 1992 with an appropriate mandate;

3/ United Nations, Treaty Series, vol. 480, No. 6964.

4/ Ibid., vol. 729, No. 10485.

4. Requests the Conference on Disarmament, in this context, to intensify its substantive work on specific and interrelated test-ban issues, including structure and scope and verification and compliance, taking also into account all relevant proposals and future initiatives;

5. Urges the Conference on Disarmament:

(a) To take into account the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, including the experience gained from the technical test concerning the global exchange and analysis of seismic data, and other relevant initiatives;

(b) To continue efforts to establish, with the widest possible participation, an international seismic monitoring network with a view to developing further a system for the effective monitoring and verification of compliance with a comprehensive nuclear-test-ban treaty;

(c) To investigate other measures to monitor and verify compliance with such a treaty, including on-site inspections, satellite monitoring and an international network to monitor atmospheric radioactivity;

6. Urges:

(a) The nuclear-weapon States to agree promptly to appropriate verifiable and militarily significant interim measures, with a view to concluding a comprehensive nuclear-test-ban treaty;

(b) Those nuclear-weapon States which have not yet done so to adhere to the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and under Water;

7. Calls upon the Conference on Disarmament to report to the General Assembly at its forty-seventh session on progress made;

8. Decides to include in the provisional agenda of its forty-seventh session an item entitled "Comprehensive nuclear-test-ban treaty".

1992

CONFERENCE ON DISARMAMENT

CD/1144
13 March 1992

Original: ENGLISH

REPORT ON THE GROUP OF SCIENTIFIC EXPERTS' SECOND TECHNICAL TEST (GSETT-2)

Sixth report to the Conference on Disarmament of the Ad Hoc Group of
Scientific Experts to Consider International Cooperative Measures
to Detect and Identify Seismic Events

EXECUTIVE SUMMARY

The present report is the sixth report overall of the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events.

The report presents the results and experiences from the Ad Hoc Group of Scientific Experts' Second Technical Test (GSETT-2). The purpose of GSETT-2 was to test initial design concepts for a modern global system for international seismic data exchange as described by the Group in its fifth report (CD/903 and Corr.1).

The report focuses on the technical and factual aspects of GSETT-2. As was stated in the Group's fifth report, the development of technical concepts for the global system needs to be a purposeful and ongoing dynamic process. It was further stated that it is necessary to test the proposed concepts in practical experiments and adjust the system design in the light of this experience. GSETT-2 was extremely important in this regard. On the basis of the results compiled in this report, the Group envisages evaluating the seismological results of GSETT-2. In a forthcoming report, the Group will assess the implications of the test for the design of the envisaged global system.

The principal purpose of GSETT-2 was to test methods and procedures developed by the Group to expeditiously extract and transmit both parameter and wave-form data from stations to the Experimental International Data Centres (EIDCs), to process them at the EIDCs and to transmit the results back to the National Data Centres (NDCs). The experiment could not have been successfully conducted without preparation of detailed instructions, acquisition of necessary equipment and adequate preparatory testing.

GSETT-2 was carried out in four phases. Phase 1, which started in August 1988, involved the establishment of experimental facilities and procedures that would form part of the system to be tested. Phase 2 began in January 1990, and comprised a number of short-term preparatory tests on the various system components. During the full-scale test (Phase 3), the entire experimental system was operated continuously for 49 consecutive days, from 22 April to 9 June 1991. Phase 4, the evaluation of the results, is still continuing.

Prior to the full-scale phase of the test, the Group stressed the essential need for broad global participation in the test so that data could be obtained from widely distributed stations. Significant technical cooperation took place among many countries in an attempt to address this problem. In all, 34 countries participated in the main phase of GSETT-2, providing seismic data from 60 seismograph stations located in all of the continents. However, the distribution of the locations was far from ideal, with few stations in South America and Africa.

Twelve stations participating in the test were arrays. The seismic array stations proved to be capable of not only providing high detection capabilities, but also supplying preliminary event locations useful in further analysis. The achievable capabilities for detecting and locating seismic events in various parts of the world are critically dependent on the availability of suitably located and sensitive stations. During GSETT-2, the observed capabilities varied considerably, being high in northern Europe and generally low in the southern hemisphere.

GSETT-2 was conducted under two ruling principles. Firstly, NDCs should report each detected signal; and secondly, EIDCs should form as many events as possible. Without further specification of detection thresholds and distance-dependent event-defining criteria, these principles inevitably led to a large number of unassociated phases and many spurious events, matters that are now being considered in the Group's ongoing evaluation.

During the test, the participating countries operated NDCs, some with assistance from other countries. Four EIDCs were operated, in Canberra, Moscow, Stockholm and Washington D.C. A variety of modern international communication links were used.

The seismic event analysis functioned on a seven-day cycle. Each of the four EIDCs produced separate seismic event lists which were updated daily as more data were analysed. On the seventh day one of the EIDCs, on a rotating schedule, compiled a merged Final Event Bulletin and distributed it to all participants.

The procedures and methods used for the extraction and exchange of data at the national facilities worked well. A fairly complex global communication network was established to transmit the voluminous data between the national centres and the international centres, and between the international centres. This communications network also worked well. The NDCs and EIDCs managed to cope with most of their demanding tasks, and demonstrated for the first time that it is possible to operate such centres based on the analysis of both parameter and wave-form data. However, a sustained, long-term test would require significant increases in resources and modifications to the procedures at both NDCs and EIDCs.

Due to considerable efforts by all participants, GSETT-2 has provided useful and valuable results. The experiment provided an opportunity to test procedures, methods and equipment for data recording, collection, compilation and analysis. The stage-by-stage approach of the three phases was essential for the successful conduct of the main test. The time period of 49 days covered by the main test was long enough to gain experience from a sustained operation.

This test was a large and in many ways unprecedented undertaking because of the complexity of the experimental system, especially the communications links used, and the expeditious nature of daily seismic event bulletin preparation and exchange. In reviewing the results of GSETT-2, the Group

notes that many of the components of the experimental global system functioned well, taking into account the size and complexity of this undertaking. The procedures and instructions were generally followed. Valuable experience was gained at both the national and the international data centres.

The Group also notes that a preliminary assessment of the results of GSETT-2 indicated some inadequacies in the instructions and procedures for the experiment. This will be the subject of further study during the evaluation phase.

GSETT-2 has provided the Group with a solid base of experience and firm technical foundation to proceed with the evaluation of the concepts proposed for the global system and to adjust the system design in the light of this experience.

Chapter 1

INTRODUCTION

1.1 Background

The present report is the sixth report overall of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

The report presents the results and experiences from the Ad Hoc Group of Scientific Experts' Second Technical Test (GSETT-2). The purpose of GSETT-2 was to test initial design concepts for a modern global system for international seismic data exchange as described by the Group in the fifth report (CD/903 and Corr.1).

The report focuses on the technical and factual aspects of GSETT-2. As was stated in the Group's fifth report, the development of technical concepts for the global system needs to be a purposeful and ongoing dynamic process. It was further stated that it is necessary to test the proposed concepts in practical experiments and adjust the system design in the light of this experience. GSETT-2 was extremely important in this regard. On the basis of the results compiled in this report, the Group envisages evaluating the seismological results of GSETT-2. In a forthcoming report, the Group will assess the implications of the test for the design of the envisaged global system.

The present consensus report on the results of GSETT-2 has five chapters, each dealing with different aspects of the experiment. Appendices containing detailed and technical material will be finalized at the Group's thirty-fourth session and documented in a conference room paper of the Group. These appendices are to be considered an integral part of the sixth report. 1/

1.2 Overview of GSETT-2

In 1987, the Ad Hoc Group of Scientific Experts agreed to conduct a large-scale international experiment on the exchange and analysis of seismic data. The experiment was named GSETT-2 (the Group of Scientific Experts' Second Technical Test). In its progress report to the Conference on Disarmament on the work of its twenty-third session (CD/745), the Group stated that:

"The principal purpose of this experiment should be the testing of methods and procedures developed by the Ad Hoc Group to expeditiously extract and transmit the data from stations to Experimental International Data Centres (EIDCs), to process them at EIDCs and to transmit the results back to participants."

1/ The appendices will be issued in Chinese, English and Russian only. Copies will be available from the secretariat of the Conference on Disarmament.

The Group's fifth report describes the initial design concepts of a modern international seismic monitoring system. These technical concepts, which were to be tested during GSETT-2, are based on the expeditious exchange of parameter (Level I) and wave-form (Level II) data and the processing of such data at IDCs. The proposed system consists of four major elements:

- (a) A global network of high-quality seismograph stations, including seismic arrays, each conforming to specified technical standards and operated according to internationally agreed rules;
- (b) Government-authorized NDCs responsible for providing agreed seismic data from national stations to IDCs;
- (c) IDCs to collect and analyse seismic parameter and wave-form data, to distribute the results of these analyses and to make the data readily available to all participants;
- (d) Telecommunications channels for the expeditious exchange of data between NDCs and IDCs, as well as among IDCs.

In its progress reports to the Conference on Disarmament, the Ad Hoc Group has described the various stages in the planning and development of GSETT-2. In addition, two internal documents (conference room papers 167 and 190) contain comprehensive descriptions of the experimental facilities being developed and the procedural arrangements.

GSETT-2 comprised four distinct phases:

Phase 1: Establishing the facilities and procedures that would form parts of the experimental system to be tested.

Phase 1 started in August 1988 and continued to the beginning of Phase 3.

Phase 2: Limited short-time tests of the experimental system in preparation for full-scale testing.

Phase 2 started in January 1990 and ended in December 1990.

Phase 3 (The main phase of GSETT-2): Full-scale testing, for 49 consecutive days, of the entire experimental system.

Phase 3 was conducted from 22 April to 9 June 1991.

Phase 4: Evaluation of the results of GSETT-2.

Phase 4 started in June 1991, and is still ongoing.

The experiences during Phase 1 and Phase 2 of GSETT-2 and the associated preparatory tests were essential for the successful conduct of the full-scale test (Phase 3).

Thirty-four countries ^{2/} participated in the main phase of GSETT-2, providing seismic data from 60 stations distributed over all continents. During this time, the participating countries operated NDCs, some with assistance from other countries. Four EIDCs were operated, in Canberra, Moscow, Stockholm and Washington D.C. A variety of modern international communication links were used.

1.3 Organization and method of work of the Ad Hoc Group

The Ad Hoc Group is open to all member States of the Conference on Disarmament, as well as other States upon invitation by the CD. Altogether, scientific experts and representatives from 27 member States of the CD and 8 other States have participated in the sessions of the Ad Hoc Group under its current mandate, which dates back to 7 August 1979 (CD/46). The names of the participants during the Group's work toward this report are listed in the appendices.

Upon invitation by the Conference on Disarmament, representatives of the World Meteorological Organization (WMO) have attended the Ad Hoc Group's sessions, and their valuable advice and assistance with regard to transmission of seismic data on the WMO Global Telecommunications System (GTS) has been greatly appreciated by the Group.

Upon invitation by the Conference on Disarmament, a representative of the International Maritime Satellite Organization (INMARSAT) attended the thirty-second session of the Group (29 July to 9 August 1991) to discuss possibilities for the use of INMARSAT in the development of the communications aspect of a future global seismic data exchange system. The Ad Hoc Group highly appreciated the presentation and technical demonstration given by the representative of INMARSAT on its high-speed data communications possibilities.

Several countries hosted informal technical workshops and arranged technical demonstrations which many of the Group's participants were able to attend, and which contributed significantly to the success of GSETT-2.

Dr. Ola Dahlman of Sweden has served as Chairman of the Ad Hoc Group. Dr. Frode Ringdal of Norway has served as the Group's Scientific Secretary. Mr. Michael Cassandra, of the CD secretariat, has served as Committee Secretary for the Ad Hoc Group. Mr. Peter Basham of Canada was elected by the Group to serve as Coordinator of GSETT-2.

^{2/} Argentina, Australia, Austria, Belgium, Canada, Chile, China, Cook Islands, Czechoslovakia, Denmark, Egypt, Finland, France, Germany, India, Italy, Japan, Kenya, Netherlands, New Zealand, Norway, Pakistan, Peru, Poland, Romania, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States of America, Union of Soviet Socialist Republics, Yugoslavia, Zambia.

In the course of its work toward the present report, the Ad Hoc Group agreed to establish five study groups, open to all participants, in order to achieve an appropriate compilation, summarization and assessment of the experience acquired through national investigations and cooperative studies in areas relevant to its work. The study groups have each dealt with a specific issue, as follows:

- Study group 1 - Seismograph stations and station network
- Study group 2 - National Data Centres (NDCs)
- Study group 3 - Experimental International Data Centres (EIDCs)
- Study group 4 - Communications
- Study group 5 - Seismological evaluation.

The study groups have been headed by convenors as listed in the appendices. The convenors contributed to the drafting of material for the present report in their respective areas. The draft material, together with over 200 informal working papers presented by the participants, was reviewed and analysed during meetings of the Ad Hoc Group.

Since the submission of its fifth report, the Ad Hoc Group has met in six sessions at Geneva (its twenty-eighth through thirty-third sessions). The Group has submitted a progress report to the CD after each of its sessions (CD/944, CD/981, CD/1032, CD/1065, CD/1097 and CD/1145 respectively).

Chapter 2

SEISMOGRAPH STATIONS AND STATION NETWORK

2.1 Introduction

One of the major components of the envisaged international seismic data exchange system tested in GSETT-2 was the seismograph stations. The basic requirements for such stations which would constitute a global network include:

Continuous acquisition of digital wave-form data, which describe seismic ground movement, and uninterrupted recording

Automated detection of seismic signals

Storage of all recorded wave-form data and extracted parameters

Instrument calibration and maintenance

Interactive data analysis.

The emphasis during GSETT-2 was on acquiring digital wave-form data and automated extraction of signals, as opposed to the experience in GSETT-1, where many of the stations were analog and only parameter data were collected. The Group had previously agreed on the need for the global system to have a network of homogeneous stations operating with agreed specifications. The Group has agreed to preliminary general technical specifications for modern prototype "CD stations" to meet this requirement.

The envisaged global system would be comprised of a mixture of three-component seismograph systems and arrays. Both types of stations were used during GSETT-2 under a variety of conditions, and this offered an opportunity to evaluate their contributions to the overall system.

A number of countries upgraded their national seismic facilities in order to participate in GSETT-2. These efforts included the development and installation of prototype "CD stations". GSETT-2 offered an opportunity to evaluate the performance of these new facilities.

2.2 Seismograph stations

There are two basic types of seismic stations which may be combined in an appropriate way to form a global network. One is a single-site seismograph system capable of extracting data in both the short-period and long-period bands, and the other is a seismic array station where seismometers are arranged in a particular geometric pattern and operated jointly, and where the data are analysed in an integrated manner.

As has already been reported, 34 countries took part in GSETT-2, giving a total of 60 stations distributed over all continents (see figure 2.1).

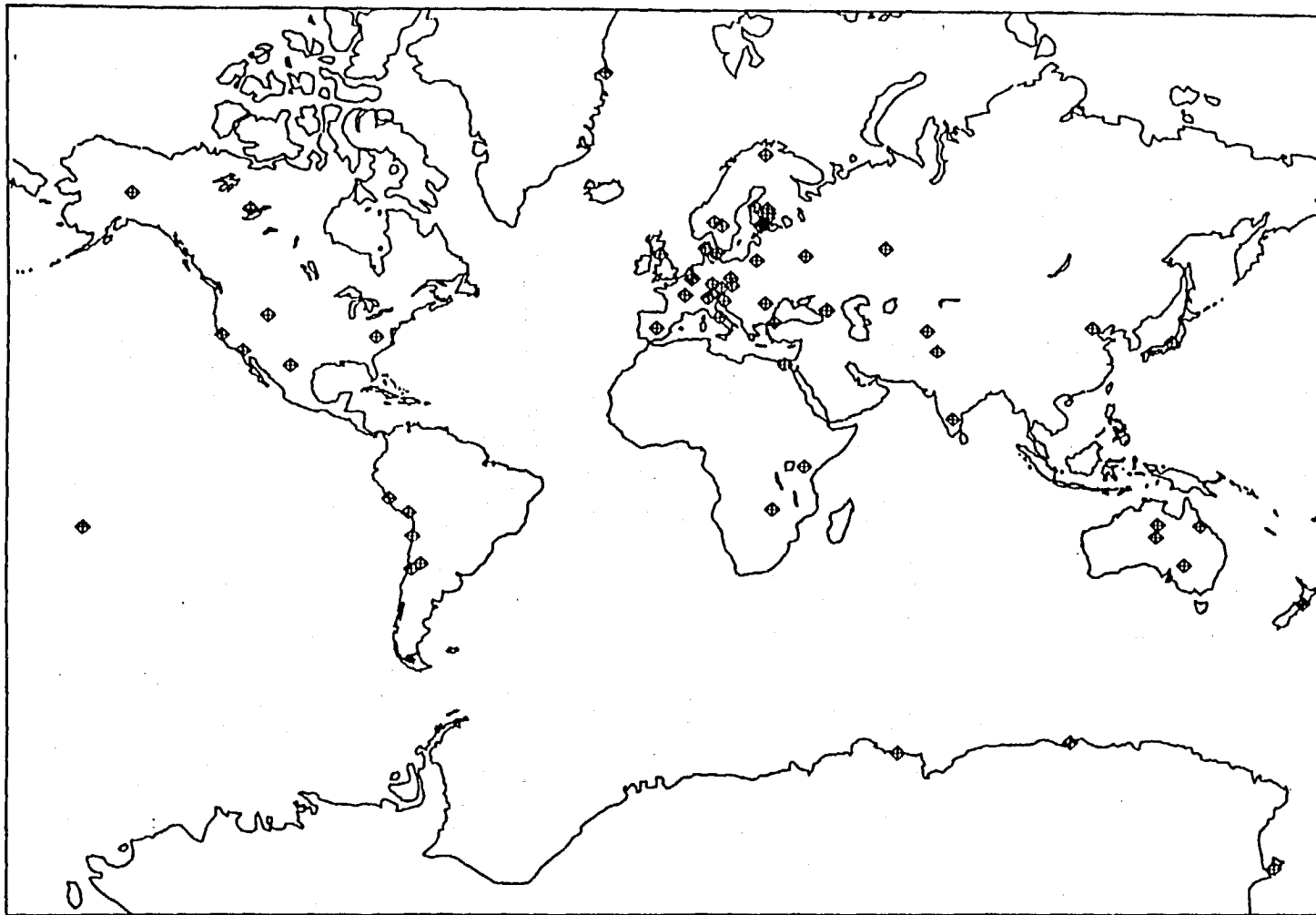


Figure 2.1. STATIONS PARTICIPATING IN THE MAIN PHASE OF GSETT-2, APRIL-JUNE 1991
Detailed descriptions of station characteristics can be found in the Group's Sourcebook for International Seismic Data Exchange, CRP/167.

The station network used in the course of GSETT-2 comprised both single-site systems and seismic arrays. Throughout this document, the general term "station" will refer to both types of installations. Each of the two basic types of seismograph station offers a number of advantages which make them useful in the global system.

The single-site station represents the basic observation point in the monitoring system envisaged by the Ad Hoc Group. During the main phase of GSETT-2, 48 of the 60 stations were of the single-site type. Twenty-seven of these were equipped with three-component seismograph systems. The remaining 21 stations had vertical component seismographs only.

Forty-one of the single-site stations used in GSETT-2 offered digital data recording. From digital three-component station recordings, all level I parameters can be extracted, including azimuth and velocity of the first-arriving P-wave. The latter two parameters can be used for rough epicentre location when the signal-to-noise ratio (SNR) is relatively high.

The seismic array is a seismological analogue of a composite radio antenna, both being used to optimize signal reception. A seismic array can also determine an approximate epicentre location. During the main phase of GSETT-2, 12 stations were of the array type.

The performance of an array depends on the number of seismometers used and the geometry of their deployment. In general, arrays are superior to single stations with respect to detection of weak seismic signals, and this is clearly seen in the statistics of event reporting from GSETT-2 given in the appendices. Figure 2.2 illustrates this point further. The 12 participating arrays reported an average of 3,000 phases each, whereas the 48 single stations averaged about 500 phases.

All but three of the stations used during GSETT-2 provided parameter reports for short-period seismic data. Long-period parameters were reported by 36 stations. A description of all participating stations is given in the appendices.

In appendix 3 to CD/903, the Ad Hoc Group outlined some preliminary specifications of a modern prototype "CD station". The concept of a "CD station" includes a list of functional and technical specifications for the standardized acquisition, processing and transmission of seismic data that must be met by stations of the global seismic monitoring system.

During GSETT-2, several countries tested various designs of "CD station", and the results were reported in national working papers. Different types of seismometers and digitizers, using different sampling rates, passbands, sensitivities, dynamic range and resolution were tested. Many different detectors and signal-processing techniques (also part of the CD station concept) were tested as well. As these functions were generally performed at the NDCs, the relevant experience is reported in chapter 3. Preliminary results suggest that all of these CD stations operated successfully during GSETT-2, keeping in mind that many systems were prototypes.

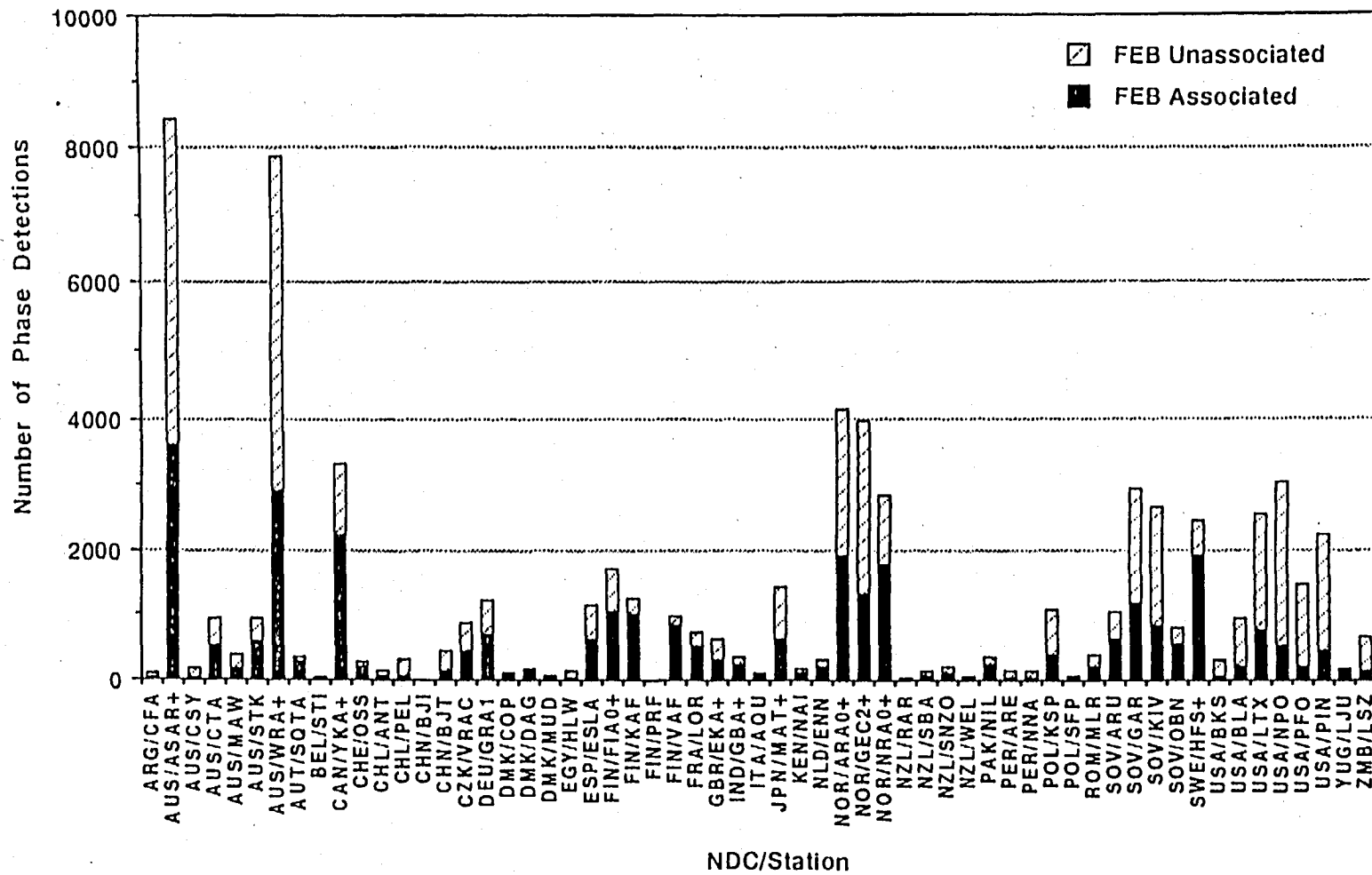


Figure 2.2. NUMBER OF ASSOCIATED AND UNASSOCIATED PHASES IN THE FINAL EVENT BULLTINS BY NDC AND STATION
 Note: Array stations are marked with +

There has been some convergence of views on such matters as sampling rate and dynamic range, and thus it is now possible to provide more detailed recommendations for CD station parameters. Some parameters may change further as the technology advances. A table with recommended technical parameters is given in the appendices.

Within the GSE, a new concept of an "open station" was introduced before GSETT-2 took place. This concept means that there exists an option for any remote user to retrieve level I and level II data directly from the field station. During GSETT-2, eight open stations were operated. The usefulness of this concept was confirmed, although the direct retrieval option was not extensively used during GSETT-2.

Many different internal formats were used by the individual seismic stations and arrays participating in GSETT-2. The common GSE data exchange format (set out in conference room paper 190/Rev.4) was therefore essential in making their outputs compatible. The diversity of stations was, nevertheless, a complicating factor in the effort to interpret the data set.

2.3 Station network

Under the new concept of expeditious exchange and routine processing at IDCs of seismic wave-form data as tested in GSETT-2, system requirements with respect to the geographical distribution of seismograph stations remain essentially unchanged as compared to the system first described in the Ad Hoc Groups's first report (CCD/558), which was based on the regular exchange of level I (parameter) data.

Compared to the GSE's first technical test (GSETT-1, 1984), the total number of stations was slightly lower (GSETT-1 had 75 stations with 8 arrays and 67 single-site stations). Nevertheless, the global coverage remained quite similar. Again, the geographical distribution of stations was far from ideal, with a very dense coverage in parts of Europe and sparse coverage especially in Africa and South America. (In particular, Africa and South America had no arrays.) This is clearly seen from figure 2.1 and also from the table below:

Continents	Single-site stations	Arrays	Total stations
Africa	3	-	3
Antarctica	3	-	3
Asia	6	2	8
Australia and Oceania	5	2	7
Europe	20	7	27
North America	6	1	7
South America	5	-	5
Total	48	12	60

GSETT-2 confirmed the importance of deploying seismograph stations at sites with low background noise levels. Stations situated on islands and in coastal areas generally contributed far less than sensitive stations in the interior of continents, but they were important in some cases.

2.4 Conclusions

GSETT-2 confirmed the importance of array stations in detecting weak seismic events at all distances and in providing initial event location information. Modern three-component stations were also found to be valuable.

During GSETT-2, various designs of a standard "CD station" were successfully tested. The "open station" concept was also tested and was found useful.

It would be desirable that all stations have available continuous digital recording rather than only data segments from detected events.

The Ad Hoc Group has previously expressed the view that the global system should consist of at least 50 stations, to be located so as to provide adequate global coverage and to conform to specified technical standards. The station network in use during the full-scale test (48 single-site stations and 12 arrays from 34 countries) comprised stations on all continents. However, the distribution of stations was very uneven.

Furthermore, a number of the participating stations did not have modern equipment and thus did not meet the standards set for the global seismic monitoring system now under development. This places limitations and constraints on using GSETT-2 results for seismological evaluation of the effectiveness of the proposed system.

Chapter 3

NATIONAL DATA CENTRES

3.1 Introduction

NDCs were operated successfully by 34 countries, some with assistance from other countries. This chapter describes the results of the NDC operations and evaluates them in the context of the system concept (the Ad Hoc Group's fifth report (CD/903 and Corr.1)) and in the light of the instructions and procedures for GSETT-2 given in conference room paper 190/Rev.4.

3.2 NDC functions

The functions and procedures of the NDCs are based on the principle that parameter and wave-form data would be reported for all recorded seismic signals so that the probability of defining new events during the EIDC processing would be maximized.

The main functions of each NDC were to:

- Collect data from stations;
- Archive data for at least 15 days;
- Detect seismic signals;
- Extract parameter (level I) and wave-form (level II) data;
- Form "NDC locations" for seismic events at local and regional distances;
- Report (transmit) data to EIDCs;
- Respond to requests for retransmission of data or for supplementary data;
- Request data from other NDCs or EIDCs;
- Receive seismic bulletins from EIDCs.

(a) Data collection and archiving

Continuous data were collected and archived by most participants in accordance with the instructions. This allowed rapid access in response to data requests. About two thirds of the stations archived data on-line (for time intervals varying from one day to permanently), allowing direct access to data in some cases. Twenty-three countries did their data processing and analysis at NDCs, although some performed these tasks at the station, as allowed for in the instructions.

(b) Signal detection

One objective of GSETT-2 was to develop and test the most effective means of automatic and interactive seismic signal processing (conference room paper 190/Rev.4, section 5.1). Twenty countries performed detection at the NDC rather than at stations. Nineteen countries operated automatic detectors, whereas only a few countries did so during GSETT-1 in 1984. Four main types of automatic detector were used: Murdoch-Hutt; STA/LTA amplitude trigger over one narrow frequency band; STA/LTA amplitude trigger over several frequency bands; and STA/LTA triggering using the binary logarithm of the amplitude. The most common of these systems was the narrow frequency band STA/LTA detector, with the majority of the participants using the single vertical channel for detection. Several participants did not use an automatic event detection system, relying on analysts to pick signal onsets. A few countries used a local/regional network in their detection process. Facilities using automatic signal detectors experienced a number of problems with false detections. Review of the results of the automatic detectors to screen out the false signals was a manual or computer-interactive process.

(c) Extraction of parameter (level I) data

The parameters to be reported routinely by NDCs are described in appendix C to conference room paper 190/Rev.4. NDCs reported more than 100,000 parameters from about 65,000 phase detections to the EIDCs. These data are displayed in figure 3.1.

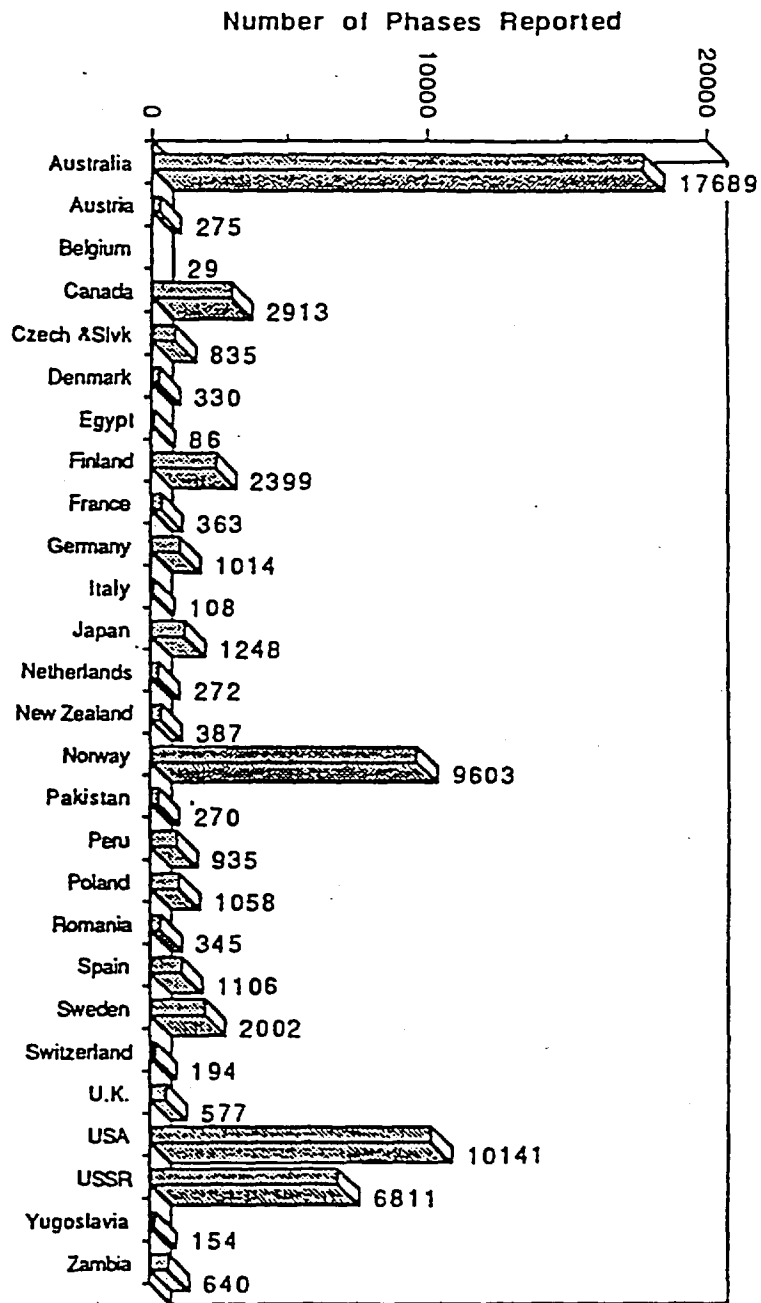
Many countries incorporated semi-automatic analysis procedures, but no country found it feasible to introduce full automation. Analysis of array data often involved automatic extraction of parameters, but in all cases data were reviewed interactively. A few countries, generally those with analog facilities, extracted parameters manually. Many countries applied ad hoc criteria in handling very small local events and did not report such events.

About 25 per cent of the NDCs used the option of abbreviated reporting for large sequences of events. Approximately a third of the NDCs applied semi-automatic three-component processing procedures to extract polarization parameters (e.g., back azimuth to the source). Only 13 of the 34 NDCs reported any long-period Rayleigh wave data, an important parameter in seismic source identification.

One station reported T-phases on three occasions, all from announced underground nuclear explosions at 2,000 km distance. There was one other station within 6,000 km, and it did not detect the events, although there were several observations at greater distances.

The procedures for reporting were designed mostly for teleseisms and, consequently, caused some difficulties with the reporting of local and regional events. Recommended changes in this regard are included in the appendices.

Figure 3.1: Number of seismic phases reported from each NDC during the main phase of GSEPT-2



(d) Extraction of wave-form (level II) data

The procedures for routine wave-form reporting by NDCs are described in appendix A to conference room paper 190/Rev.4. Most NDCs fulfilled the wave-form segmentation and reporting procedures. Several NDCs were unable to report wave-form data because of the lack of appropriate digital instrumentation, communication facilities, or links (see chapter 5). Wave-form segmentation procedures were quite satisfactory for reporting teleseismic events. However, for local and regional events, there were occasions when the required lengths of wave-form segments did not encompass all potentially useful seismic phases. Although it was not mandatory to do so, several countries reported long-period wave-form segments, but in GSETT-2 these were rarely used by any of the EIDCs.

Although three-component short-period data were archived and analysed at NDCs, in most cases only the vertical-component wave-form data were reported, as required, to EIDCs.

(e) Events locations reported by NDCs

In a new and unique contribution, 17 countries reported about 5,000 event locations based only on national data. Eight of these reported locations based on data from local networks, 13 reported locations based on data from single stations, and 5 reported locations based on array data. Some countries used more than one method of reporting.

(f) Data messages

Twenty-two countries produced routine parameter and wave-form messages automatically, which helped to reduce format errors. Most of the data were received by EIDCs in time to use in producing their Initial Event Lists.

The four EIDCs requested data from NDCs in order to help them in improving their Current Event Lists. NDCs did not always respond to these requests. In some cases, the response time was much too long to be used in preparation of Current Event Lists or Final Event Bulletins. NDCs were entitled to request any wave-form segment from any participating station. Thirteen countries exercised this option during the full-scale test. Only a few countries had attempted this in the preparatory tests. About 15 per cent of these requests were not responded to. In addition, some responses were not fulfilled expeditiously, taking up to several days. NDCs sent general messages for a number of purposes; however, there is some question as to whether they were used in any way. As a result of experiences during the preparatory tests, NDCs were to transmit a weekly listing of their messages (transaction log). Countries were able to do this on a regular schedule. It was found that there was some ambiguity in the instructions for data request messages and general messages.

On a positive note, Final Events Bulletins were generally received (as bulletin messages) in a timely fashion (after about one week) by most NDCs; however, in a few cases, they were received only after about two weeks or longer.

(g) Data outages

Outages at NDCs and stations were not reported in detail; however, the information available suggests that most of the NDCs and stations were fully operational for approximately 95 per cent of the time. A clear definition of what constitutes a data outage is needed for better record-keeping, which, in turn, would allow a more detailed assessment.

(h) Quality control

There were no formal quality control measures for GSETT-2, but some level of quality control was exercised at all NDCs. This involved ensuring that analysts followed exactly the procedures set out in conference room paper 190/Rev.4 (message-formatting rules, parameter-reporting rules, etc.). The Group should consider making quality control part of the operating procedures.

(i) Resources

GSETT-2 was a large undertaking for many NDCs. The level of effort varied and depended on a number of factors - for instance, available resources, number and type of stations, level of preparedness, regional seismicity, etc. The level of effort that was necessary to carry out the test successfully had been generally underestimated by the participants. Well over 100 people were involved with NDC operations during the seven weeks of the full-scale test. To meet all schedules and adhere precisely to all procedures would have taken a significant increase in resources and well-trained personnel. Limitations in resources constrained most, if not all, countries to some degree in carrying out the test.

3.3 Conclusions

Detailed information about detector parameters used by participants is not available at the present time, and may never be; thus the results of these systems cannot be accurately assessed. It is recommended that a comprehensive evaluation of several different detectors operating on a common data set should be undertaken by several countries.

Procedures for reporting data from local and regional seismic events are inadequate. Special criteria should be developed for the reporting of local events.

Not all countries reported locations determined by NDCs when they were in a position to do so. During GSETT-2, such reports improved the accuracy of locations in many cases. For some stations azimuthally dependent regional models might improve location and magnitude determinations. When local network locations are reported, the data upon which they were based should be available upon request.

Not all countries reported long-period parameter data even when available, despite the clear instructions to do so in the conference room paper. Adequate reporting of such data is essential.

There was a varying degree of automation in use at NDCs. Further automated procedures would reduce the strain on manpower resources and are strongly recommended.

No formal quality control measures were defined for GSETT-2. Quality control should be made a specific part of the operating procedures of a future global system.

Useful comments were provided by NDCs in parameter reports, but not all of those comments were used in event location and phase association. A future global system should be able to accommodate more supplementary information of this kind. It is important that comments be formalized so that they can be interpreted automatically.

Chapter 4

EXPERIMENTAL INTERNATIONAL DATA CENTRES

4.1 Introduction

During GSETT-2, four EIDCs were operated, by Australia (Canberra, CNB), Sweden (Stockholm, STO), the Union of Soviet Socialist Republics, (Moscow, MOS), and the United States (Washington, D.C., WAS). Each EIDC operated independently and exchanged data and processing results on a daily basis in order to develop the final EIDC products. The EIDCs and resources required to operate them are described briefly below and in detail in the appendices to this report.

The main functions of the EIDCs were to:

Collect Level I and Level II data from the NDCs.

Maintain a complete database of all data received.

Allow NDCs unrestricted access to all data and messages less than two weeks old.

Respond to NDC requests for data and bulletins.

Exchange transaction logs with other EIDCs on a daily basis.

Request missing messages.

Automatically prepare Initial Event Lists (IELs) using all parameter data received by the cut-off time, and exchange these with other EIDCs.

Using wave-form analysis, prepare Current Event Lists (CELs) and exchange these with other EIDCs.

On a rotating basis, merge the latest CEL from each EIDC into a Final Event Bulletin (FEB) and distribute each FEB to all NDCs.

4.2 Inputs to EIDCs from NDCs

A total of about 65,000 phase detections were reported from 60 stations in 34 countries. Twenty-seven countries submitted a total of more than 80,000 wave-form segments from 48 stations.

The EIDCs received 30,000 messages (approximately 1 gigabyte of data) from the NDCs. In addition, over 3,000 duplicate messages (several hundred megabytes) were received. On a typical day the EIDCs received about 600 messages (approximately 16 megabytes of data), and on peak days twice this amount. More than 95 per cent of the data was wave-form data.

The largest volume of data (approximately 40 megabytes) received on one single day was received on 25 May; this was due to a combination of many phase detections the previous day and a large amount of data sent in response to

EIDC requests. About 10 per cent of the messages exchanged in the full-scale experiment were sent in response to EIDC requests. This was the first test of the NDC request function.

On 29 April a large earthquake, with more than 100 aftershocks, occurred in the western Caucasus. For this day alone, almost 3,000 phase detections were reported. Compared to earlier experiments in GSETT-2, the volumes of data received increased by a factor of two. The increase can partly be explained by the fact that more local and regional phases were reported by the NDCs. To cope with the unexpectedly large volumes, some EIDCs had to upgrade their hardware and software during the experiment.

Roughly 20 per cent of the phase detections arrived after the scheduled deadline, for IEL production. The times in the message headers indicate, however, that about half of these detections were sent prior to the deadline.

The agreed formats were in general found to be adequate. Only a few per cent of the wave-form messages could not be automatically parsed. More than 10 per cent of the parameter messages could not be automatically parsed. Most of the erroneous messages were submitted by countries which did not participate in the preparatory tests.

Transaction logs were received from 23 NDCs. They were, however, found to be of limited use for the EIDCs. In order to have been useful, the NDC transaction logs would have had to be received on a daily basis in a fully formalized message. This would have enabled timely and automatic checking of the reception of messages sent by the NDCs.

About 200 messages received by the EIDCs were corrections of previously received messages.

4.3 Requests to and responses from NDCs

During the full-scale test the request function to and from NDCs was tested for the first time.

The EIDCs received more than 300 request messages from 13 NDCs requesting wave-form data (80 per cent), bulletins (15 per cent), or parameter data or retransmission of missing or garbled messages (5 per cent). Not all of the NDC data requests were fulfilled. Reasons for this deficiency included software difficulties at EIDCs and NDCs, station or NDC outages and lack of understanding of the procedures.

Besides software difficulties, some EIDCs encountered problems owing to lack of fully automatic request-handling programs and insufficient manpower. Occasionally, requests concerning data not routinely reported could not be satisfied as the appropriate NDC could no longer access the data.

A few requests for data older than 15 days, i.e. data no longer required to be on-line, were also received by the EIDCs.

The EIDCs requested over 2,600 wave-form segments from NDCs; roughly 10 per cent of these requests were made on behalf of an NDC. In response, the EIDCs received more than 1,700 wave-form segments. The median response time as "experienced" by the requesting EIDC was 18 hours, i.e., within the required 24-hour limit. Frequently, NDCs which were unable to provide the requested data sent an explanatory message in response to the requests. Some typical reasons given were limited storage capacity, no detections, station outage or lost data.

As the request function of the NDCs and EIDCs had not been thoroughly tested during the preparatory tests, it became evident during the full-scale test that a number of issues had not been specified to the necessary level of detail. Some examples are given in the appendices.

Overall, the request functions at NDCs and EIDCs were not adequately tested during GSETT-2, mainly because of the heavy workload at NDCs and the lack of streamlined procedures.

4.4 Products of EIDCs during GSETT-2

The EIDCs started their analysis by calculating an Initial Event List (IEL) on the second day. The IELs were calculated by automatic association and location programs, and entirely based on NDC parameter reports arriving at the EIDCs before the end of day 1 (day 0 being the day when the event was recorded). During the following four days the EIDCs produced Current Event Lists (CELs), in which results from interactive analysis were included. The majority of the IELs and CELs were produced and exchanged on time by the EIDCs. Some EIDCs started the wave-form analysis on day 3; others included the results of the wave-form analysis only in the final CEL on day 6. This late inclusion of the results of interactive analysis was caused by the large workload and to some extent by limitations in hardware and software systems.

There were significant differences in the software used to incorporate the results of wave-form analysis in the CELs. Some EIDCs used the event list generated by the automatic association and location program as a start, from which they improved the event solutions in the interactive analysis. These EIDCs did not rerun the automatic program once the wave-form analysis had started. A different approach, used by other EIDCs, was to submit changes, such as added phases, retimed arrival times and changed association/disassociation of arrivals to particular events, to the automatic association and location software, which was then rerun for each CEL.

On day 7, one of the EIDCs, following a rotating schedule, compiled the Final Event Bulletin (FEB) and its abbreviated version (AFB) and distributed them to all the participants. Most of the FEBs were produced on time, but occasionally some EIDCs had minor delays in the compilation of the FEB. All but two FEBs were completed within eight days.

The merging of the four CELs into one FEB is a completely automatic process which follows the rules set out in appendix J of conference room paper 190/Rev.4. Some EIDCs, on their own initiative, applied checks of the

validity of defining observations. The number of events not fulfilling the GSETT-2 criteria decreased as the EIDCs improved and gained more experience. Due to software problems, some valid observations and some events fulfilling the GSETT-2 criteria were also rejected by mistake.

The agreed rules on how to merge CELs into FEBs were occasionally found to cause merging of events in a way which was not seismologically correct. For example, events occurring close in time and space were sometimes incorrectly merged together into one event. On other occasions, events which should have been grouped together were reported separately in the FEB, because they only had one defining observation in common.

4.5 Experience with data analysis

In the interactive data analysis, the EIDCs reviewed the wave-forms from the majority of the generated events. The EIDCs used the wave-form data to improve the reported parameter data, and to judge the validity of an event and its associated phases.

The improvements to parameter data mainly consisted of adding new arrivals, renaming phases and retiming arrivals. The EIDCs added roughly 7,000 new arrivals, and about 40 per cent of these were considered to be depth phases. Renaming and retiming was performed on roughly 5-10 per cent of all arrival data by those EIDCs using these options.

The NDCs reported over 6,500 long-period measurements, of which more than 50 per cent were noise measurements for detected short-period arrivals. Due to the large workload at the EIDCs, efforts were concentrated on establishing valid events. The EIDCs performed only very limited wave-form analysis on surface (Rayleigh) waves. However, it was possible to associate two thirds of the reported surface waves to events using the automatic association software.

Data from stations well distributed in distance and azimuth are required to determine the origin times and locations of seismic events accurately. To improve the processing it was necessary to request supplementary wave-form data from the NDCs. The EIDCs requested approximately 2,600 wave-forms from the NDCs and were able to identify several hundred new phases as a result.

By using a number of other parameters (azimuth, slowness and angle of incidence) in addition to signal arrival times to evaluate event hypocentre parameters, EIDCs were able to streamline the source determination procedure and improve the accuracy of source parameters.

As much as 80 per cent or more of the events in the automatically generated Event Lists were modified by the EIDCs in the interactive data analysis. Roughly half of the changes were major, affecting the event locations by more than 50 km and/or the event depth by more than 10 km.

When deciding whether an event was valid or not, the locations reported by the NDCs were of great value. Qualifying remarks, reported locations, distance and phase names were used by the EIDCs when judging whether a phase was defining or not.

More than 3,700 events were defined in the FEBs - on average 90 events per data day. Approximately 40 per cent of the events in the FEBs were reported by all four EIDCs, and 60 per cent by at least three EIDCs. More than 50 per cent of the reported phases could not be associated to an event by the EIDCs. This is similar to the experience from GSETT-1, and also similar to what is observed at agencies such as the National Earthquake Information Center in the United States or the International Seismological Centre in the United Kingdom. Approximately half of the unassociated phases were of local or regional origin as reported by the NDCs.

Depth is an important diagnostic aid for source identification. One way of improving the accuracy of determining the depth of an event is the use of depth phases in event solutions. The usefulness of wave-form data at the EIDCs was clearly demonstrated by the fact that as many as 40 per cent of the depth phases were added by the EIDCs, as a direct result of wave-form data analysis. Compared to the first technical test conducted in 1984, the number of reported arrivals per data day increased by a factor of 3 and the number of events defined in the Final Event Bulletins increased by a factor of 4.

4.6 Inter-EIDC procedures

The EIDCs produced and exchanged approximately 3,000 messages (190 megabytes of data). Of these, approximately 2,000 were request messages, 800 were bulletin messages and 200 were system messages. The volume of data was dominated by bulletin messages (170 megabytes). In order to maintain identical databases, the EIDCs exchanged daily logs of all messages received. These logs were compared automatically and missing messages were requested from the appropriate EIDC database. Some EIDCs encountered problems and could not reconcile their databases during the main phase of the test.

The number of data retransmission requests made by the EIDCs as a result of the database reconciliation process was less than 5 per cent of the total number of messages. Nearly all of the requests for retransmission were satisfied by the EIDCs automatically.

No formal reconciliation of the CELs took place among the EIDCs. The daily exchange of CELs, however, permitted analysts to review the results of the other EIDCs' processing and thereby improve their own event lists.

4.7 Data availability and archiving at EIDCs

The EIDCs provided NDCs with interactive access to the EIDC databases. In this way, NDCs could browse through and retrieve data and send it to their own databases. The Ad Hoc Group has not agreed on a common interface for the NDCs to access the EIDC databases, but some EIDCs supplied menus to guide the NDCs through the contents of their databases. Several NDCs tested these procedures.

The EIDCs maintained on-line interactively accessible databases for 15 data days for most of the time. Due to the unexpectedly large volumes of data, some EIDCs were unable to keep all 15 data days on-line at all times.

4.8 Location capability achieved during GSETT-2

The general performance of a seismological monitoring system can be judged in terms of the quality of the FEB. This performance is closely linked to the adequacy of the technical components of the system; it especially depends on the spatial distribution of seismic stations.

Using again GSETT-1 as a reference (18.7 events per day), nearly five times as many events were located during GSETT-2 (89 events per day). This comparison indicates a remarkable increase in the number of located events. Figure 4.1 shows the events located by the EIDCs, as reported in the FEBs, during the main phase of GSETT-2.

A large percentage of event locations was derived from very few station readings. These locations have to be investigated in detail to separate real events from artificial associations. In this context, those events reflecting local or regional recordings (within 20°) should be studied separately. The association of crustal P phases did not appear to be very reliable or consistent. This association often ignored the experience and advice of the NDC analysts. In addition, it appeared that too little regard was taken of qualitative remarks supplied by the NDCs.

Finally, an important aspect of GSETT-2 was to demonstrate the usefulness and effectiveness of including wave-form data in the processing at the future IDCs so as to improve the quality of the event bulletins. Although the EIDCs convincingly showed the effort they made in this respect (about 7,000 new phases were added after inspection of the wave-forms), the influence on the quality of the event locations needs further study.

4.9 Phase association

In the processing of seismic network data, individual phase detections corresponding to the same seismic event must be properly associated and grouped together. For teleseismic monitoring using global network data, such techniques are well established. The inclusion of regional and local phases in the phase association procedure leads to a considerable increase in the complexity of the task.

A clear correlation between station sensitivity and unassociated phases can be stated in general. A preliminary investigation of the unassociated signals indicated that most of them stem from small events at regional or even local distances from the sensitive stations of the network. Compared to GSETT-1, the percentage of unassociated phases remained essentially unchanged (it was 53 per cent during GSETT-2). Taking into account those local or regional phases which were associated by NDCs reduced the number of unassociated phases during GSETT-2 to 44 per cent. This is similar to the experience at other international seismological centres. Contrary to the expectations expressed in the Group's previous reports, the availability of wave-form data did not automatically reduce the number of unassociated phases.

As experience at other international seismological centres shows, the number of unassociated phases is also not reduced by increasing the number of stations.

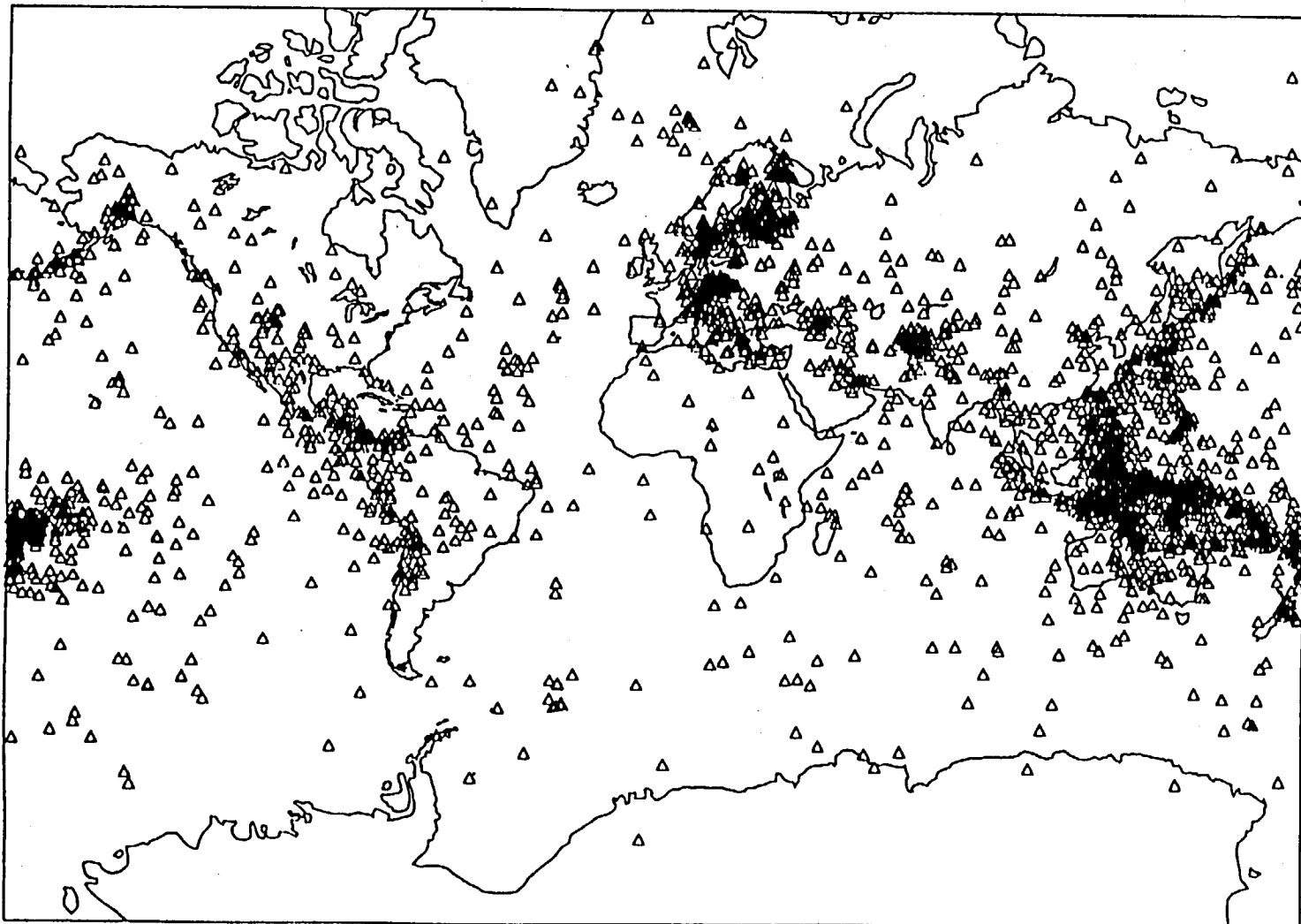


Figure 4.1. EVENTS LOCATED BY THE EIDCS DURING THE MAIN PHASE OF GSETT-2.
The figure includes all epicenters reported in the Final Event Bulletins.

To reduce the number of unassociated phases is an important aspect of the further evaluation of GSETT-2. Techniques for automatic association of regional seismic phases recorded by a single array should be investigated. The use of additional information from local networks, available to NDCs, in the association procedure at EIDCs has to be discussed.

Most important, the unavoidable trade-off between detection threshold and unassociated phases in any seismic network has to be considered within the framework of a future monitoring system.

4.10 Reprocessing experiment

One of the problems encountered during GSETT-2 was that not all data arrived at the EIDCs within the required schedules, and that some data did not arrive at all the EIDCs. After the main phase of GSETT-2 had been completed, the four EIDCs decided to reconcile their databases so as to obtain one complete and agreed database of GSETT-2. They also agreed to reprocess five days' data representative of the seismic activity during GSETT-2. Preliminary results indicate that the products of the EIDCs improved after reprocessing, and that the resulting bulletins are more consistent than was achieved during Phase 3 of GSETT-2. This can be exemplified by the percentage of events in the FEBs common to all EIDCs, which has increased from 40 per cent to 80 per cent.

The results of the reprocessing experiment will be included in the appendices to this report.

4.11 Conclusions

The methods and procedures adopted by the Group for GSETT-2 were in general found to be adequate. Although the EIDCs were unable to review all the wave-form data, some EIDCs were able to review most of the wave-form data sent from the NDCs. The difficulties experienced during GSETT-2 by the EIDCs were due to a number of factors: lack of experience with global network data processing, ambiguities in the GSETT-2 procedures, the unanticipated volume of data, and limited hardware, software and manpower resources.

The review of wave-form data at the EIDCs was found to be useful for improving the quality of the final bulletin.

New methods, specifically developed for routine analysis of wave-form data from a global network, need to be developed and tested. The database collected during GSETT-2 will be of great value for developing these methods and for the seismological evaluation of GSETT-2.

Not all the EIDCs were able to provide easy access to their stored data for the NDCs.

Although some problems became evident, GSETT-2 demonstrated that it was possible to run four EIDCs according to the instructions given for the main phase of the experiment.

Chapter 5

COMMUNICATIONS

5.1 Introduction

Communications links to support the exchange of messages between the participants were an important and integral part of the global system established for GSETT-2. During the planning stages of GSETT-2, it became evident that the ambitions of the experiment were such that recent advances in telecommunications technology would have to be taken into account wherever possible in establishing these links. The exchange of large amounts of wave-form (level II) data, in particular, required the use of efficient communication means.

The communications system established for GSETT-2 comprised high-capacity dedicated links between the four EIDCs, as well as connections between each of the NDCs and the inter-EIDC network. This system evolved through several stages, over a period of approximately two years or more. This stepwise approach and gradual build-up to the main phase of GSETT-2 proved to be very beneficial. Many participants were able to test different communication means and choose the optimum one. Others were able to familiarize themselves with and exploit the newest developments in communications technology, from experience gained during preparatory experiments. The communications system established for GSETT-2 and the international cooperation associated with it represents an unprecedented undertaking in seismology.

5.2 Links between NDC and EIDCs

A large variety of different types of physical links and associated protocols were used by the NDCs for their communication with the EIDCs. These communication means ranged from computer-to-computer file transfer on high-speed dedicated links to low-speed telex lines. The various communication means adopted basically reflected what was available to each participant and what was needed in terms of capacity, but factors such as economy, technical experience and knowledge of the NDC staff were also important in this regard. The appendices provide in tabular form an overview of communication means and protocols used by each individual NDC. Some of the experience gained with the various types of links is summarized below.

The WMO Global Telecommunications System (WMO/GTS)

WMO/GTS is a worldwide communications network established and operated jointly by the 155 WMO member States and territories for the exchange of meteorological data. The WMO has authorized the use of GTS for the exchange of seismic data in experiments conducted by the Ad Hoc Group.

During preparations for GSETT-2, a special communications node was set up in Moscow to receive and transmit parameter and wave-form data using WMO/GTS. Altogether seven NDCs made some use of, or tried to make use of, WMO/GTS

channels during Phase 3 of GSETT-2. Some countries that had earlier used WMO/GTS were able to establish computer-to-computer connections with EIDCs prior to the start of Phase 3 and made extensive use of these links.

GSETT-2 demonstrated that WMO/GTS in general proved useful for transmitting parameter data, from NDCs to EIDCs, when appropriate arrangements had been made well in advance. Attempts at transmitting large volumes of messages, such as wave-form data, from NDCs to EIDCs, and bulletins from EIDCs to NDCs, however, met with little success. It was noted that WMO/GTS is still the only means of transmitting seismic data in many parts of the world. Details on the use of WMO/GTS during GSETT-2 are given in the appendices.

Other types of links between NDCs and EIDCs

Approximately 99 percent of the messages sent from NDCs to EIDCs during Phase 3 of GSETT-2 were transmitted using other means than WMO/GTS. Examples of such other types of links were dedicated high-speed links, public networks like PSDN, Internet and Bitnet, and dial-up lines. Only minor problems were associated with the use of links in this broad category. A number of countries also established links for alternative routing of their messages to the EIDCs, and were able to use these when problems occurred with their "main" circuit.

The satellite-based INMARSAT system was tested and used for the first time for the exchange of parameter and wave-form data. It was noted that INMARSAT is a highly flexible system that can be used virtually all over the globe and thus offers a potential for communication to and from locations not serviced by other modern communication means. Data transfer rates on the INMARSAT system that will permit transmission of large volumes of data are available today or will be in the near future.

During GSETT-2, the vast majority of messages were exchanged by direct computer-to-computer file transfer, using a variety of different links and protocols. The largest volumes were exchanged using the ftp protocol. Three countries used the electronic mail (X.400 protocol) successfully. Other protocols used were VAXSPI, UUCP and Kermit. There were in general very few difficulties related to the use of communication protocols, and NDC and EIDC operators cooperated closely to solve the few problems that occurred.

5.3 Inter-EIDC network

To fulfil the basic GSETT-2 requirements of reliable and timely exchange of data between the EIDCs, high-speed dedicated links were established. The dedicated links installed were as follows: 9.6-kbps satellite link between Canberra and Washington, a 56-kbps fibre optical link between Washington and Stockholm, a 19.2-kbps satellite link between Washington and Moscow, and a 9.6-kbps phone line between Stockholm and Moscow.

During the first week of Phase 3 of GSETT-2, three of the inter-EIDC links were fully functional. The line between Moscow and Washington became operational on 29 April, seven days into the test. After this date, all

four lines were operational, with only very short breaks, throughout the duration of GSETT-2, with one exception: the line between Canberra and Washington broke on 2 June and was not available for four days. Alternative routings via PSDN and Internet were established, however, and all the data were successfully transmitted, although with some delay.

The Washington Communications Hub and the Stockholm Communications Node were particularly important elements in the inter-EIDC network, as they facilitated data exchange and interconnected NDCs and EIDCs through a variety of communications links. The Washington Communications Hub provided a communications gateway in Europe through the Zurich Node. On a daily basis, the Washington Communications Hub produced and distributed to all participants a "traffic report", listing all messages that had been exchanged. Figure 5.1 shows the inter-EIDC links, and also the links used by the NDCs to transmit data to the EIDCs.

No general communications technique was adopted for the inter-EIDC network as a whole. Rather, it was decided to test simultaneously systems using different methods to ensure proper routing of messages. A set of rules was developed that defined how the various components of the systems were to interact with each other.

Considering the complexity of the inter-EIDC network and the different communications methods used, it is fair to state that the inter-EIDC network worked very well during Phase 3 of GSETT-2. Only very few of the problems encountered in the course of GSETT-2 could be associated with failures in components of this network.

More details on the inter-EIDC network are given in the appendices.

The total cost (no manpower costs included) incurred by the four EIDCs for establishing and operating the inter-EIDC network through Phases 1, 2 and 3 of GSETT-2 was approximately US\$ 1 million.

5.4 Data formats and volumes, reliability and timeliness

The Ad Hoc Group developed a common format for data and messages that were exchanged during GSETT-2. This format is well documented in Conference room paper 190/Rev.4. Since this format had already been used throughout the preparatory tests, only a few countries had difficulties adhering to it during Phase 3. These were mainly countries that had not participated in GSETT-2 prior to Phase 3.

The total volume of data received by each of the four EIDCs during Phase 3 of GSETT-2 was approximately one gigabyte. The total amount of data submitted by all the NDCs varied from 12 to 29 megabytes per data day. In an appendix, the distribution of this total volume among the originating NDCs and EIDCs is tabulated. The table gives the total number and volume of messages sent from each NDC, and the corresponding number and volume of messages received by each of the four EIDCs. Also given are figures for the messages generated by each of the four EIDCs and sent to the other EIDCs.

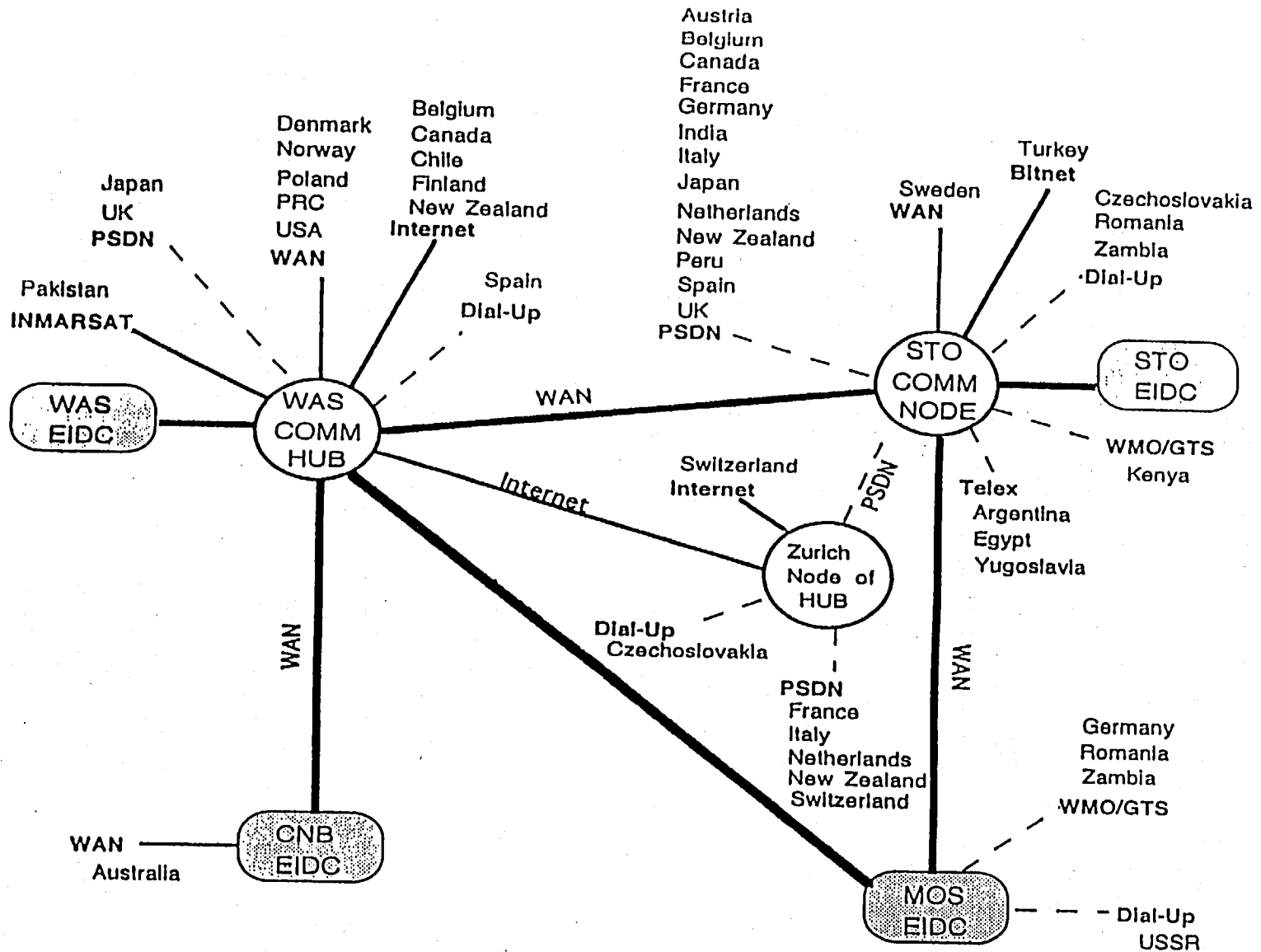


Figure 5.1 COMMUNICATIONS LINKS USED DURING PHASE 3 OF GSETT-2
 Note: This Figure shows the Inter-EIDC links and the NDC to EIDC links used to transmit data to the EIDCs

The main reason for the difference between the amounts of data sent and received was duplication of messages. This duplication was caused by the aforementioned simultaneous use of different communications methods among the EIDCs. Even though the amount of duplicate messages was considerably reduced during Phase 3 compared with earlier stages of GSETT-2, the duplicate messages accounted for about 15 per cent of the total data volume. The presence and handling of these messages in their databases was not a major problem for the EIDCs; still, it represented an added load, and extra care should be taken in possible future experiments to avoid this situation, which appears in particular to result from the handling of message requests.

Loss of data in the communications circuits is another reason for differences between the amounts of data transmitted and received. The EIDCs performed, on a daily schedule during GSETT-2, comparisons of their message logs to overcome discrepancies between message databases. This procedure revealed that about 1 per cent (the figure was a little higher for Moscow) of the total volume of messages was initially missing in the databases of each of the EIDCs. After completing this reconciliation process with an exchange among EIDCs of missing messages, the discrepancies between what was sent from the NDCs and what was eventually contained in the EIDC data bases were minimal. This meant that the number of cases in which NDC messages did not reach any of the EIDCs was very low. In any case, it was possible for missing messages to be identified from the sequence numbering system adopted, and thus requests for retransmission of missing data were sent to the message originator.

Data compression schemes were successfully used by the majority of the participating countries. Relative to uncompressed data, this reduced the data volume by approximately half, without loss of information content.

Statistics on message "travel times" (the difference between the time a message reached the recipient and the sending time reported in the message header) show that the majority of the links performed in a timely manner, such that the GSETT-2 schedules could be adhered to. There were, however, several occasions on which the message travel times were surprisingly long, also for high-speed connections, causing message arrival after the deadline. Most of these late messages were, however, incorporated at a later time and are reflected in the event bulletins. Still, these cases should be further investigated in order to fully understand the nature and causes of the delays, and to gain further experience for future tests.

5.5 Conclusions

Overall, the communications network established for GSETT-2, comprising links between NDC and EIDCs as well as inter-EIDC links, worked very well. With very few exceptions, the elements of this network fulfilled the basic objective of enabling the reliable and expeditious exchange of large amounts of seismic data and other messages.

The volume of data exchanged during Phase 3 was twice as great as was expected from the earlier stages of GSETT-2. This is attributed in part to the fact that more stations joined the experiment, but also to a higher emphasis on the reporting of local and regional events. It is noteworthy that the communications network, which was basically designed and implemented during the earlier stages, was still able to cope with the data volumes during Phase 3.

One of the reasons for the successful exchange of data during GSETT-2 was the redundancy built into the links. Although it was not a requirement for the conduct of GSETT-2, the availability of alternative routings made the communications network very robust.

In short, GSETT-2 demonstrated that communication means and associated protocols are available today that permit extensive data exchange within a global seismic monitoring system.

Glossary

Seismological terms and abbreviations used in this document

Amplitude	The maximum deflection from a zero reading of a recorded seismic wave-form
Analog wave-form	A seismic wave-form in a non-numeric continuous representation
Array	An ordered arrangement of seismometers, the data from which are transmitted to a central computer and processed jointly in order to increase the possibility of distinguishing weak signals from noise
Arrival	The appearance of a seismic signal on a seismic record as determined visually or automatically using a set of criteria
Beamforming	The process of adding together time-shifted signals from the individual instruments of a seismic array
Bitnet	A worldwide data communications network
Body wave	A seismic wave that propagates through the Earth's interior (longitudinal P-waves and transverse S-waves)
Body wave magnitude	See mb
Broad-band instruments	Seismographs that record a wide range of signal frequencies, thus encompassing the short-period and long-period bands
CEL	Current Event List, produced at Experimental International Data Centres
Degree	A measure of distance (one degree (1°) is approximately 111 km)
Depth phases	Seismic waves that have been reflected from the Earth's surface above the seismic source
Digital wave-form	A seismic signal represented as a sequence of numbers
EIDC	Experimental International Data Centre operated during GSETT-2
Epicentre	The point on the Earth's surface which is directly above the seismic source

FEB	Final Event Bulletin, produced at Experimental International Data Centres
Filtering (frequency filtering)	The processing of operating on any signal to enhance particular frequencies and suppress others
Filtering (polarization filtering)	A technique for enhancing one particular mode of wave propagation and suppressing others by combining the outputs of three-component recordings
GSE	Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events
GSETT (or GSETT-1)	The Ad Hoc Group of Scientific Experts' first technical test, conducted in 1984
GSETT-2	The Ad Hoc Group of Scientific Experts' second technical test, described in this report
GTS	Global Telecommunications System of the World Meteorological Organization
Hypocenter	Location of the source of an event
IDC	International Data Centre in the envisaged global system
IEL	Initial Event List, produced at Experimental International Data Centres
INMARSAT	International Maritime Satellite Organization
INTELSAT	International Telecommunications Satellite Organization
INTERNET	A collection of worldwide communications networks that are interconnected
kbps	Kilobits per second; a measure of data transmission rate
Level I data	Data (on amplitude, period, arrival time of waves, etc.) used for the description of seismic signals (often referred to as "parameter data")

Level II data	Segments of seismic data as recorded at individual stations (often referred to as "wave-form data")
Lg	A seismic phase that propagates in the upper crustal layers of the earth. For continental paths, Lg is often the strongest phase on a seismogram
Local events	A seismic event located within about 2° (about 200 kilometres distance from a station)
Long-period (LP) waves	Seismic waves of period more than 20 seconds
LP	See long-period waves
Magnitude	A measure of the size of a seismic event, as determined from seismograph observations
mb	Body wave magnitude, usually calculated from recorded vertical-component short-period P-wave data
Ms	Surface wave magnitude, usually calculated from recorded vertical-component long-period Rayleigh wave data
NDC	National Data Centre operated by individual countries
Parameter	A quantity (usually a number) describing a particular feature of the recorded data
Parse	To verify that a message conforms to a specified format, and resolve the message into its component parts
P-wave	A seismic body-wave of the compressional type
PKP-wave	A P-wave that has propagated through the Earth's core
Period	The time interval corresponding to one cycle of a vibration on a seismogram
PSDN	International Packet-Switched Data Network
Quality control	Measures and procedures to ensure that a satisfactory quality of data is produced at every stage of processing in the global system

Rayleigh wave	A seismic surface wave characterized by an elliptical motion in the vertical plane
Regional event	A seismic event located between about 2° and about 20° distance from a station (beyond 200 kms to about 2,200 kms)
S-wave	A seismic body wave of the shear type
Seismogram	A seismic record containing wave-forms covering a certain time interval (e.g. 24 hours)
Seismograph, seismometer	Instruments designed to detect Earth motions caused by seismic events
Short-period (SP) waves	Seismic waves of period around 1 second
SNR	Signal-to-noise ratio
SP	See short-period waves
STA/LTA	The ratio between short-term and long-term average amplitude of a seismic wave-form
Surface wave	A seismic wave that propagates along the upper layers of the Earth
Surface wave magnitude	See Ms
T-phase	A seismic wave for which the propagation path is partly through the ocean
Teleseismic event	A seismic event located beyond about 20° distance from a station (2,200 kms and beyond)
Three-component seismograph	A seismograph system recording earth motion in three perpendicular directions (vertical, north-south, east-west)
X.25	A transmission protocol used for the Packet-Switched Data Network
WAN	Wide area network
WMO	World Meteorological Organization

CONFERENCE ON DISARMAMENT

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THIRTY-THIRD SESSION OF THE AD HOC GROUP OF SCIENTIFIC
EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE MEASURES
TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-third formal session from 2 to 13 March 1992, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-fifth session of the Group, convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group is open to all member States of the Conference on Disarmament. It is also open on a standing basis to all non-member States which have been invited upon their request by the Conference on Disarmament to participate in its work. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Belgium, Canada, China, Czech and Slovak Federal Republic, Egypt, Germany, Hungary, Italy, Japan, Mexico, Netherlands, Poland, Romania, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. On the basis of previous invitations by the Conference on Disarmament, Scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Denmark, Finland, New Zealand, Norway, Spain and Switzerland.
4. During the session, 28 papers containing information on national investigations related to the work of the Group were presented by experts from Australia, Austria, Czech and Slovak Federal Republic, Egypt, Finland, Germany, Japan, Norway, Peru, Romania, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland, and United States of America.

5. The Ad Hoc Group completed a technical and factual evaluation of its Second Technical Test (GSETT-2). The results are contained in its sixth main report, being submitted to the Conference on Disarmament for its consideration as document CD/1144. The Group envisages submitting during its next session extensive appendices to the sixth report, which will contain detailed technical material.

6. The Group noted that as a result of GSETT-2, a unique seismological database has been established and is being used as the basis for the ongoing comprehensive scientific evaluation by the Group. The Group noted with appreciation that the United States delegation had compiled this database on compact discs and had distributed them to all participants.

7. The Group considers that the results of the comprehensive scientific evaluation, together with the results of GSETT-2 (CD/1144), form a basis for reassessing the concepts for a global monitoring system proposed by the Group in its fifth report to the Conference presented in 1989 (CD/903 and Corr.1). Such a reassessment, which will also take into account recent scientific, technical and other developments, will be reported on during the first part of the 1993 session of the Conference.

8. The Ad Hoc Group continued its discussions on the future work of the Group remaining under its current mandate as regards the development and testing of the scientific aspects of a global system for international cooperative measures to detect and identify seismic events. The Group expressed the view that much valuable work remains to be done on the development of the global system taking into account an assessment of the implications of the results of GSETT-2 and advances in relevant technology.

The Group preliminarily discussed specific recommendations in this regard that include specific procedures for an experimental system of international exchange of data on seismic events and realistic testing of its components. This testing would include additional bilateral and multilateral cooperative experiments and would strive to have the widest possible global participation. The work would, inter alia, include:

- "CD-station" design and testing
- Site selection studies and experimental station deployments
- Use of new data communication technologies
- Study of the feasibility of reducing the number of IDCs including a proposal on the use of one IDC
- Study of the feasibility of the use of "open" stations
- Network studies in relation to network capability
- Development of detailed instructions for further experimental testing of the refined concepts
- Development of cost estimates

9. The Ad Hoc Group envisages continuing the discussion of its future work, including the incorporation of new technologies, at its next session.

10. The Ad Hoc Group noted with appreciation the convening of an informal technical workshop by the United States in Dallas, Texas, from 3 to 5 December 1991, to evaluate the results of GSETT-2, particularly the activities at national facilities. Many participants of the Group were able to attend and contribute to the workshop. This aided in the preparation of the Group's report on GSETT-2.

11. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 27 July to 7 August 1992.

CONFERENCE ON DISARMAMENT

CD/1151
1 June 1992

Original: ENGLISH

LETTER DATED 29 MAY 1992 FROM THE REPRESENTATIVE OF NORWAY
ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON
DISARMAMENT TRANSMITTING A SUMMARY OF A STUDY ON A
COMPREHENSIVE TEST-BAN TREATY

My delegation would request your kind assistance in having the enclosed contribution by Norway circulated as a CD document.

The document gives a summary of a study on a Comprehensive Test Ban Treaty which was the subject of a Workshop in Oslo in late March this year.

The full report from the study will be made available later.

(Signed) Jostein Bernhardsen
Minister Counsellor

Introduction

For many years the achievement of a Comprehensive Test-Ban Treaty (CTBT) has been a central Norwegian foreign policy goal. A total and permanent ban on all nuclear testing is essential in order to halt effectively both the vertical and horizontal proliferation of nuclear weapons. Furthermore, another important reason for the discontinuance of all nuclear test explosions is the environmental and health risks associated with underground nuclear explosions.

The Conference on Disarmament is an appropriate forum for dealing with the issue of a Comprehensive Test-Ban Treaty. The Norwegian Ministry of Foreign Affairs wished to contribute to the work of the Conference on Disarmament when it took the initiative to carry out a study on some of the most important questions related to a CTBT.

Individual chapters were prepared by renowned international experts and modified in view of comments at a workshop held in Oslo late in March 1992. These chapters discuss reasons for nuclear testing, the history of public opinion on the matter, environmental effects of underground nuclear explosions, partial test limitation treaties in force, attempts at reaching a CTBT, and verifying compliance with a CTBT.

A final chapter presents the assessment of the experts assembled at the workshop on the utility and feasibility of a CTBT, based on the material of the individual chapters and the discussion and analysis at the workshop. This document consists of the final chapter of the study.

The members of the expert group were:

- Professor Steven A. Fetter
University of Maryland
- Professor Trevor Findlay
The Australian National University
- Professor Joseph Rotblat
Pugwash Conferences on Science and World Affairs
- Professor Richard L. Garwin
Columbia University/IBM Research Division
- Dr. Jozef Goldblat
Arms Control Consultant
Senior Lecturer and Research Fellow at the Geneva Graduate Institute
of International Studies
- Phil.lic. Jan Prawitz
Ministry of Defence, Sweden
- Director Frode Ringdal
Norwegian Seismic Array (NORSAR)

The report was finalized at a workshop in Oslo 30-31 March 1992. Director Sverre Lodgaard of the International Peace Research Institute, Oslo, chaired the workshop.

PERSPECTIVES FOR A FUTURE COMPREHENSIVE TEST-BAN TREATY (CTBT)

I. Purpose and objectives of a CTBT

Ever since the destruction of Hiroshima and Nagasaki in 1945, nuclear test explosions have served as a constant reminder of the threat to the survival of mankind. For years they were also seen as a manifestation of the nuclear arms race and of the competition between the super-Powers for world hegemony.

Nuclear testing is now on the decline. In 1991, the total number of test explosions was the lowest in 30 years. At the same time, major reductions in the nuclear armories are being planned.

The main argument for a CTBT is no longer the need to halt the arms race among the nuclear-weapon States. Today, the two overriding concerns are:

- the environmental effects of continued nuclear testing;
- the dangers of nuclear proliferation.

These aspects, as well as the military and political implications of a CTBT are discussed in detail in the various chapters of this report. A brief summary of the motivation for a CTBT is given below:

Environmental aspects

One of the central purposes of the 1963 Partial Test-Ban Treaty was to reduce the radiation hazard from nuclear tests. This has been borne out by the experience since then, but nevertheless there are numerous examples of venting of radioactive debris following underground nuclear tests.

Venting has occurred at all the major nuclear test sites, and has in some cases been detected across national borders. In the United States, a particularly serious incident was the venting from the Baneberry test on 18 December 1970, which was also registered in Canada. At the Semipalatinsk test site in Kazakhstan, many people appear to have been exposed over the years to significant doses of radiation after venting. A recent example of venting at the Novaya Zemlya test site in the Arctic part of Russia is the nuclear explosion on 2 August 1987, which caused radioactivity to be detected in Scandinavia.

An almost permanent legacy of underground tests is the inventory of long-lived radioactive elements deposited underground. In terms of health effects, this addition to the radioactive burden is small. However in some cases, as in the Moruroa Atoll, leakage may occur also in the short term. Little is known about the long term effects of such contamination, and this is clearly a case for concern.

Special concern has been expressed in the Nordic countries about the potentially adverse effects of continuing nuclear testing in the fragile Arctic environment of Novaya Zemlya.

A CTBT would put an end to the additional contamination of the environment with radioactive substances released by future nuclear explosions.

Non-proliferation aspects

A CTBT would help legitimize increased international pressure on the nuclear threshold countries who have not joined the NPT to forgo the nuclear weapon option. In some cases, regional approaches to a CTBT might be important steps toward this aim.

A CTBT would strengthen the non-proliferation regime by eliminating one element of friction concerning the inequality of the obligations assumed under the Non-Proliferation Treaty by the nuclear haves and nuclear have-nots.

A CTBT would satisfy an important requirement put forward by some non-nuclear-weapon countries for the extension of the duration of the Non-Proliferation Treaty after 1995 - for another lengthy period (or periods) or indefinitely.

In principle, it would be possible for a non-nuclear-weapon State to build a nuclear armoury without testing. This is surely far more feasible than it was in 1945 or during the 1950s. However, in an era in which both a CTBT and the NPT were in force, such an activity would be fraught with political hazards. There is also a high likelihood that a non-tested stockpile would in fact not function.

An important psychological impact, not usually taken into account, would occur through the weapon scientists and engineers of the advanced nuclear States. If nuclear testing is made illegal, the nuclear weapon personnel in the United States and Russia will be extremely vigorous about policing such a ban in the rest of the world, as well as in their own countries.

For these two reasons - the psychological motivation of large numbers of people in the nuclear-weapon establishment in the nuclear-weapon States to police vigorously a CTBT, and the hazards, impediments and uncertainties which a CTBT era would impose on the would-be proliferators - a CTBT would be a major tool to inhibit proliferation of nuclear weaponry.

Military and political implications

A CTBT would be an event with considerable confidence-building effects. It might strengthen the growing conviction about the uselessness of nuclear weaponry for the security of nations.

It might relieve the psychological stress associated with the apocalyptic nature of nuclear weapons.

In so far as concern about "technological surprise" has driven the arms race, a CTBT may remove one of the causes of this apprehension: it would make it unlikely that something completely new, unpredictable and exotic would suddenly emerge in the nuclear field.

Under a CTBT regime, the nuclear-weapon States would be expected to maintain high reliability of nuclear weapons to ensure deterrence. However, if confidence in the stockpiled weapons were to be gradually eroded, the probability that a nuclear-weapon Power would launch a first disarming nuclear strike would be further diminished.

A CTBT would provide a tangible proof that the nuclear-weapon Powers have decided to proceed from quantitative cuts of their arsenals to qualitative constraints.

By contributing to confidence building, a CTBT may facilitate the negotiation of other multilateral arms control measures. It is noteworthy that no multilateral nuclear arms control agreement of a global nature has been concluded since 1980.

A CTBT would signal a considerable reduction in the human and material resources which are spent on the development and modernization of nuclear weapons. The savings would be substantial; the cost of a single nuclear weapon test explosion is estimated at 30-100 million US dollars.

The conclusion of a CTBT would fulfil the pledge undertaken by the parties to the 1963 Partial Test-Ban Treaty to negotiate a total ban on nuclear weapon test explosions. It would also go some way towards meeting the obligation undertaken by the nuclear-weapon Powers under the 1968 Non-Proliferation Treaty, and included in United Nations resolutions, to bring about nuclear disarmament.

In the early days of the nuclear era, a CTBT would have had a major impact on limiting the numbers of nuclear weapons and their overall capability. Today, the major reductions that are underway in the United States and former Soviet armouries are more significant than a CTBT would be at this moment. Nevertheless, a CTBT would add to the benefits of these reductions.

II. Arguments for further testing - an assessment

Many reasons have been advanced in favour of nuclear testing. Among the main arguments are: to support the development of new nuclear weapons, to ensure confidence in the nuclear stockpile and to improve the safety and security of nuclear weapons. Some of these arguments have merit. However, they must be weighed carefully against the arguments in favour of a CTBT.

Looking back over more than three decades of occasionally intense public debate over nuclear test limitations and the advisability of a CTBT, it is striking how the arguments against a CTBT are now weakened.

During the 1980s the traditional objection in the United States to a CTBT (lack of verifiability) was supplemented by a long list of objections. Each is considered in turn below.

Safety considerations

If nuclear weapons must exist, they should be as safe and secure as possible. Nuclear weapons should be immune from accidents such as a nuclear explosion or a dispersal of plutonium if a bomb is dropped accidentally, and they should be protected from unauthorized use by both terrorists and armed forces personnel.

Questions of safety and security of nuclear weapons can be explored by analysis and non-nuclear tests. Enhanced control over nuclear weapons can be obtained by refitting modern permissive action links (PAL), but in an era in which there is a massive decrease in numbers of nuclear weapons, older weapons can be destroyed first, leaving the surviving warheads as the safest and most secure.

Not only do reduced numbers of warheads contribute to enhanced overall safety and control, but the lack of a requirement for a hairtrigger response allows them to be stored and maintained more securely.

Development of new warheads

The principal argument for nuclear testing, now as always, is to support the development of new nuclear weapons. Whatever the urgency in the past of weapon tests to develop new warheads in order to respond to developments on the other side, it is far less now.

Indeed, the argument was never compelling. When the United States sent John Glenn, the astronaut, into space, it did not redevelop him. Instead, NASA packaged him, so that he would be protected against the vacuum, cold, heat, and shock of the flight.

New delivery vehicles can be built around the existing designs of warheads. It is not necessary to develop new warheads to achieve this aim.

Finally, there are experiments in physics that can best be done with nuclear explosions and sometimes in no other way. But the physics community, in fact, has not in general proposed to spend money on such experiments, even when there was no bar to doing so.

Stockpile confidence

Much of the nuclear nations' drive for nuclear testing in the past arose from the desire to gain an advantage over the other side, or to learn what the other side might already have learned in nuclear testing or might be able to learn, so as not to be "behind" the other side.

It was argued that many deficiencies had been discovered in stockpile nuclear weapons through nuclear testing, and that they required nuclear testing to remedy. In reality, no weapon that had been thoroughly tested in development revealed unexpected troubles in stockpile testing, within the range over which it had been tested. Nuclear tests did reveal deficiencies at

extremely low ambient temperature, or with older tritium boost gas than had been used in the test. But suspected deficiencies of this type could have been countered by non-nuclear measures.

Although nuclear redesign or the substitution of a new development was sometimes the preferred "remedy", this was certainly not necessary. For the future, there is technical agreement between those in the weapon laboratories and those outside that a vigilant programme of stockpile inspection and non-nuclear testing will suffice to reveal potential problems. These problems can then be remedied by re-manufacturing the warheads to the original specifications. Fifty years from now that may not be the most convenient approach, since industrial processes will surely change, but it will just as surely be a feasible one.

The proposal is not to keep individual nuclear warheads reliable for 100 years, which would lead to a whole new field of weapon geriatrics, but to remanufacture them after 10-15 years, so that one would always be dealing with weapons precisely of an age and type with which the weapon establishments have experience.

Maintaining expertise

It is inevitable that the technological base for weapon development and stockpile maintenance will erode under a CTBT, but this process is likely to be gradual. Moreover, it is likely that the nuclear-weapon States would continue to give considerable support of their weapon laboratories, in order to ensure that essential expertise is not lost.

To prevent a kind of genetic drift by the accumulation of small changes, each one "certified" to be insignificant by a responsible board, is a matter of putting in place a board composed of responsible technical people interested in maintaining the stockpile at initial performance, rather than in incorporating "bright" ideas.

Expertise can also be maintained in the study of inertial confinement fusion (ICF), and there is, in fact, a problem of definition if one approaches useful power release from multiple explosions of tiny pellets in the ICF programme.

In the context of a CTBT, a possible approach would be to announce in advance the location and time of every explosion of any kind with an explosive yield above 10 tons, and to carry out nuclear-related explosions, such as ICF, only in permanently occupied buildings.

III. Verification of compliance with a CTBT

A CTBT would need to be accompanied by a global verification system. The principal component of such a system would be an international monitoring network of sensitive seismic stations. Such a system should make use of the most recent technological advances and also incorporate high-quality stations of the array type. On-site challenge inspection, use of satellite imagery,

measurement of airborne radionuclides and other supplementary verification measures are also envisaged. Provisions for reporting and possibly observing chemical explosions exceeding a specified size should be worked out.

The text of a CTBT should be publicized widely by all treaty parties. All parties should also enact national legislation prohibiting their citizens from engaging in activities that are banned internationally under a CTBT, including a requirement that violations must be reported to national and international authorities. In fact, verification by the people, or "whistle-blowing", might add an entirely new dimension to the effectiveness of CTBT verification. This is particularly relevant in view of the recent developments in the formerly closed Soviet society.

Given a CTBT era in which the State's commitment and its domestic legal standing is widely publicized, and in which United Nations sanctions may follow discovery of a clandestine test, it seems unlikely that a signatory State would attempt clandestine testing.

IV. Possible approaches to a CTBT

A Comprehensive Test-Ban Treaty (CTBT) would be a multilateral treaty banning all nuclear test explosions by all States for all time:

We recommend the early signing and ratification by the nuclear-weapon States of a CTBT to take effect, say, in 1995.

If the United States and Russia decide instead to negotiate further limitations on nuclear tests, as they have pledged to do, the first step should be meaningful: it should severely constrain, if not render impossible, the development of new designs of nuclear weapons by the nuclear-weapon States and the manufacture of nuclear weapons by non-nuclear-weapon States.

A limited test ban, whatever the threshold or annual quota, may apply only to nuclear-weapon States. Any tests still permitted under such an agreement would have to be subject to stringent measures to prevent environmental damage. Any new limited test ban would have to contain a binding commitment to a total ban.

A nuclear test ban concluded among the States in particularly sensitive regions, like South Asia or the Middle East, could constitute an early step toward renunciation by these States of the nuclear weapon option.

CONFERENCE ON DISARMAMENT

CD/1163
7 August 1992

Original: ENGLISH

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE
THIRTY-FOURTH SESSION OF THE AD HOC GROUP OF SCIENTIFIC
EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE MEASURES
TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-fourth formal session from 27 July to 7 August 1992, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-sixth session of the Group, convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group is open to all member States of the Conference on Disarmament. It is also open on a standing basis to all non-member States which have been invited upon their request by the Conference on Disarmament to participate in its work. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Canada, China, Czech and Slovak Federal Republic, Egypt, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Netherlands, Pakistan, Peru, Romania, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. Scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Finland, New Zealand, Norway, Spain and Switzerland.
4. During the session, 38 papers containing information on national investigations related to the work of the Group were presented by experts from: Australia, Austria, Czech and Slovak Federal Republic, Finland, Germany, Hungary, Indonesia, Italy, Japan, New Zealand, Norway, Peru, Romania, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland and United States of America.

5. During its previous session, the Ad Hoc Group completed a technical evaluation of its Second Technical Test (GSETT-2). The results are contained in its sixth main report, submitted to the Conference on Disarmament as document CD/1144. During the present session, the Group completed five appendices to the sixth report, containing detailed technical material.

6. The Group continued its discussions on the seismological evaluation of the GSETT-2 and reviewed national investigations relevant in this regard. Subsequently the Group discussed a draft outline of the evaluation report and agreed on focusing this report on the detection and location capabilities achieved during GSETT-2. The Group envisages a report on this evaluation during its next session.

7. The Ad Hoc Group conducted in-depth discussions on the reassessment of the concept of a global system for the exchange of seismic data worked out in its Fifth Report (CD/903), based on the results and experiences gained from GSETT-2 and on recent scientific and technological developments. The discussions were focused on the overall design of the system and provided a basis for the direction of the Group's future work.

8. The Group noted that many of the results and experiences obtained in GSETT-2 will be important in reassessing the system concept and its various components. Some of the conclusions the Group drew from GSETT-2 will have a significant influence on the overall design of the system, e.g.:

- the need to take into account information from local and regional seismic networks;
- the future use of only one IDC (International Data Centre) in the global system;
- the need for improved analysis procedures, with emphasis on automation especially for event definition, location and depth estimation;
- the need for a network with adequate global coverage of high-quality stations, especially arrays.

9. The Group noted that many countries had undertaken bilateral cooperation in upgrading data acquisition, communication and data exchange systems during the GSETT-2. The Group encourages this cooperation to continue as it would contribute significantly to the future improvement of the system.

10. Over the last decade, scientific and technological developments have been significant not only in seismology, but also in information technology, an area of great importance for global seismological monitoring systems. The Group firmly believes that the design of the global system should fully utilize recent developments in science and technology. The Group identified the following areas as being important for the overall system concept:

- the rapid developments in global telecommunications;

- the general availability of high performance computers and methods and procedures for data management and analysis;
- the developments in regional seismology, i.e., based on seismological observations at distances less than 2,000 km.;
- the issues of redundancy, data authenticity, reliability and security.

The Ad Hoc Group envisages continuing the discussion of its future work, including the incorporation of new technologies, at its next session.

11. As to the overall conceptual design, the Group agreed on a tentative framework for studying design options, thus providing guidance to the more detailed work on the individual components of the system. This overall design concept might be revised in the light of results obtained from analysis of individual components.

This overall framework includes, inter alia:

- There should be only one IDC, which would operate on the basis of:
 - (i) providing high quality data for national verification needs;
 - (ii) increased automation in the analysis and operational procedures;
 - (iii) improved quality control in all aspects of the system;
 - (iv) improved procedures for waveform analysis;
 - (v) the possibility of accepting and processing continuous digital data, provided that the seismological value of this can be demonstrated.
- The system would be composed of a global network of arrays and single stations, complemented by national regional networks consisting of stations intended primarily for surveillance of national and regional seismicity.
- The global network would consist of high quality stations and arrays. Such a network could be modelled by starting with the best stations in operation during GSETT-2, and extending these geographically to give uniform coverage. This network could then be extended or reduced in size to demonstrate several networks of varying sensitivity. Station types might be site-dependent. They should be open stations. Network studies should be based on revised event definition criteria to be proposed by the "Procedures" working group. Standards for station operation should be high.
- For the national regional networks, NDCs should be encouraged to report as accurately as possible on seismic events occurring within their territories. NDCs should be responsive to requests for data from their national networks.

In addition to the items listed above, the Group will endeavour to estimate the detection and identification capability of such global systems (see CCD/PV.713 of 22 July 1976 and CD/PV.48 of 7 August 1979).

12. The Ad Hoc Group established nine working groups of participating experts to elaborate on the following topics relevant to the design of the global system:

- Overall concepts
- Station design
- Site selection
- Network studies
- Seismological procedures
- Establishment of a single International Data Center
- Communications
- Interaction by the IDC with national regional networks
- Cost estimates

13. The Ad Hoc Group noted with appreciation the convening of an informal technical workshop by Australia in Canberra from 27 April to 1 May 1992 to evaluate the results of GSETT-2. Many participants of the Group were able to attend and contribute to the workshop. This aided in the Group's continued work on this subject.

14. The Ad Hoc Group has expressed the view that it might be useful, on a scientific and technical level, to share with the International Atomic Energy Authority (IAEA) the GSE technical concepts for the global exchange of seismic data in order to determine if the IAEA has particular technologies or experiences that might be useful to the Group in its work. To this end, the Ad Hoc Group suggests that, without any financial implications to the Conference, the IAEA be invited to send an observer to attend the Ad Hoc Group's next session.

15. The Ad Hoc Group suggests that its next session, subject to approval by the Conference on Disarmament, should be convened from 15 to 26 February 1993.

CONFERENCE ON DISARMAMENT

CD/1163/Corr.1
13 August 1992

Original: ENGLISH

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE
THIRTY-FOURTH SESSION OF THE AD HOC GROUP OF SCIENTIFIC
EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE MEASURES
TO DETECT AND IDENTIFY SEISMIC EVENTS

Corrigendum

Page 4, paragraph 14, line 3:

correct "Authority" to read "Agency".

CONFERENCE ON DISARMAMENT

CD/1167

14 August 1992

Original: ENGLISH

LETTER DATED 12 AUGUST 1992 FROM THE REPRESENTATIVE OF NORWAY
ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON
DISARMAMENT, TRANSMITTING A REPORT OF THE EXPERT STUDY ON
QUESTIONS RELATED TO A COMPREHENSIVE TEST BAN TREATY 1/

I have the honour to enclose herewith the full report of the Expert Study on questions related to a Comprehensive Test Ban Treaty, the final summary chapter of which was circulated as document CD/1151. The study, composed by internationally renowned experts in the field, was commissioned and published by the Norwegian Ministry of Foreign Affairs.

As you will recall State Secretary Helga Hernes introduced the Study in her statement before the CD on 11 June this year.

Yours sincerely

(Signed) Bjørn Skogmo
Ambassador
Chargé d'Affaires a.i.

1/ A limited distribution of this report in English only has been made available to members and non-members invited to participate in the work of the Conference on Disarmament. Additional copies are available from the Permanent Mission of Norway in Geneva.

CONFERENCE ON DISARMAMENT

CD/1173
3 September 1992

Original: ENGLISH
(EXTRACT)

REPORT OF THE CONFERENCE ON DISARMAMENT TO THE GENERAL ASSEMBLY OF THE UNITED NATIONS

CONTENTS

	<u>Paragraphs</u>	<u>Page</u>
I. INTRODUCTION	1	1
II. ORGANIZATION OF WORK OF THE CONFERENCE	2 - 20	1
A. 1992 Session of the Conference	2 - 4	1
B. Participants in the Work of the Conference	5	1
C. Agenda and Programme of Work for the 1992 Session .	6 - 8	1
D. Attendance and Participation of States not members of the Conference	9 - 10	4
E. Expansion of the membership of the Conference	11 - 14	5
F. Improved and Effective Functioning of the Conference	15 - 19	5
G. Communications from Non-Governmental Organizations	20	7
III. SUBSTANTIVE WORK OF THE CONFERENCE DURING ITS 1992 SESSION	21 - 119	7
A. Nuclear Test Ban	25 - 34	9
B. Cessation of the Nuclear Arms Race and Nuclear Disarmament	35 - 56	11

...
A. Nuclear Test Ban

25. During the first and second parts of the annual session, the Conference had before it the sixth report (CD/1144) and the progress report (CD/1145) on the thirty-third session of the Ad Hoc Group of Scientific Experts to Consider International Co-operative Measures to Detect and Identify Seismic Events.

(continued)

The Ad Hoc Group met from 2 to 13 March, under the Chairmanship of Dr. Ola Dahlman of Sweden. At its 621st plenary meeting on 21 May 1992, the Conference took note of the sixth report of the Ad Hoc Group and adopted the recommendations contained in paragraph 11 of its progress report.

26. During the third part of its annual session, the Conference had before it the progress report of the Ad Hoc Group on its thirty-fourth session (CD/1163), which had taken place from 27 July to 7 August, under the continued Chairmanship of Dr. Ola Dahlman of Sweden. At its 632nd plenary meeting on 18 August 1992, the Conference adopted the recommendation contained in paragraph 15 of that report, thereby approving the dates of the next session of the Ad Hoc Group from 15 to 26 February 1993. Furthermore, as suggested by the Ad Hoc Group in paragraph 14 of the report, the President, with the agreement of the Conference, extended an invitation to the IAEA to participate in the work of the Ad Hoc Group at its next session.

27. Throughout the session, a number of delegations commented in plenary meetings on the work of the Ad Hoc Group, as contained in the official records of the Conference.

28. The following documents were presented to the Conference under the agenda item:

(a) Document CD/1151, dated 1 June 1992, submitted by the delegation of Norway, transmitting a Summary of a Study on a Comprehensive Test-Ban Treaty; and

(b) Document CD/1167, dated 14 August 1992, submitted by the delegation of Norway, transmitting a report of the Expert Study on Questions related to a Comprehensive Test Ban Treaty.

29. At the start of the 1992 session, the President of the Conference carried out consultations on an appropriate organizational arrangement for agenda item 1, entitled "Nuclear Test Ban".

30. At the Conference's 612th plenary meeting on 13 February 1992, the President of the Conference appointed Ambassador Prakash Shah of India as Special Co-ordinator to seek agreement on such an organizational arrangement for agenda item 1.

31. At the Conference's 622nd plenary meeting on 26 May 1992, the nuclear-weapon State which had not participated in the previous work of the Ad Hoc Committee on a Nuclear Test Ban announced its decision to join the Ad Hoc Committee when it is re-established.

32. At the Conference's 631st plenary meeting on 13 August 1992, the Special Co-ordinator reported that he had carried out active and intensive consultations with delegations throughout the three parts of the annual session of the Conference this year, both bilaterally and through open-ended meetings, to ensure that there would be agreement among all delegations to re-establish the Ad Hoc Committee with a mandate acceptable to all. A series of proposals on a draft mandate for the Ad Hoc Committee's re-establishment had been put forward and considered, along with a proposal for a programme of

work for the 1992 session, which for some delegations, was an important component of the package. The Special Co-ordinator reported that throughout the consultations, he had found general agreement among all delegations to re-establish the Ad Hoc Committee during the 1992 session and to start its work quickly. The growing importance of agenda item 1 was recognized by all delegations. An overwhelming majority of delegations had expressed their willingness to give a mandate to the Ad Hoc Committee to continue, as a step towards achieving a nuclear test ban treaty, substantive work on specific and interrelated test ban issues. A growing number of delegations had felt that the Conference must immediately begin serious and sustained consideration of agenda item 1, particularly in the light of the conclusion of negotiations on a chemical weapons convention. While substantial progress had been made on improving the previous mandate, no final agreement had been possible before the end of the 1992 session. The Special Co-ordinator expressed his hope that the results achieved in 1992 would not be lost sight of when efforts were continued next year to re-establish the Ad Hoc Committee at the beginning of its 1993 session. In view of the overwhelming interest in this item among the members of the Conference on Disarmament, he recommended that the Conference re-establish the Ad Hoc Committee at the beginning of the 1993 session and make urgent efforts towards a negotiating mandate for the Ad Hoc Committee.

33. Many views on the substance of the issue of a nuclear test ban, as well as on organizational issues, were expressed in the plenary meetings of the Conference throughout the annual session and are contained in the following official records of the Conference: (CD/PV.606, 609, 611 to 615, 618 to 635).

34. The Conference agreed to intensify its consultations with a view to the re-establishment of the Ad Hoc Committee on a Nuclear Test Ban at the beginning of the 1993 session.

1993

CONFERENCE ON DISARMAMENT

CD/1177

14 January 1993

Original: ENGLISH

(EXTRACT)

LETTER DATED 29 DECEMBER 1992 FROM THE SECRETARY-GENERAL
OF THE UNITED NATIONS ADDRESSED TO THE PRESIDENT OF THE
CONFERENCE ON DISARMAMENT TRANSMITTING THE RESOLUTIONS
AND DECISIONS ON DISARMAMENT ADOPTED BY THE GENERAL ASSEMBLY
AT ITS FORTY-SEVENTH SESSION*

I have the honour to transmit herewith the texts of the resolutions adopted by the General Assembly at its forty-seventh session, which entrust specific responsibilities to the Conference on Disarmament in 1993. The relevant provisions of those resolutions are reproduced in the Annex.

For the information of the Conference, I also have the honour to transmit herewith other resolutions and decisions, dealing with or related to disarmament matters, adopted by the General Assembly at its forty-seventh session.

(Signed) Boutros Boutros-Ghali

* For texts of resolutions 47/59 and 47/76, and of decisions, see Add.1.

(2) In resolution 47/47, operative paragraph 4 reaffirms the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty, and in this context urges the re-establishment of the Ad Hoc Committee on a Nuclear Test Ban in 1993; operative paragraph 5 requests the Conference on Disarmament, in this context, to intensify its substantive work begun in 1990 on specific and interrelated test-ban issues, including structure and scope and verification and compliance, taking also into account all relevant proposals and future initiatives; operative paragraph 6 urges the Conference on Disarmament:

(a) To take into account the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, including the experience gained from the technical test concerning the global exchange and analysis of seismic data, and other relevant initiatives; (b) To continue efforts to establish, with the widest possible participation, an international seismic monitoring network with a view to developing further a system for the effective monitoring and verification of compliance with a comprehensive nuclear-test-ban treaty; (c) To investigate other measures to monitor and verify compliance with such a treaty, including on-site inspections, satellite monitoring and an international network to monitor atmospheric radioactivity; and operative paragraph 7 calls upon the Conference on Disarmament to report to the General Assembly at its forty-eighth session on progress made, including its recommendations on how the objectives of the Ad Hoc Committee on item 1 of its agenda, entitled "Nuclear Test Ban", should be carried forward most effectively towards achieving a comprehensive test-ban treaty.



General Assembly

Distr.
GENERAL

A/RES/47/46
18 December 1992

Forty-seventh session
Agenda item 53

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY

[on the report of the First Committee (A/47/683)]

47/46. Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water

The General Assembly,

Recalling its resolutions 44/106 of 15 December 1989, 45/50 of 4 December 1990 and 46/28 of 6 December 1991,

Reiterating its conviction that a comprehensive nuclear-test-ban treaty is the highest-priority measure for the cessation of the nuclear-arms race and for the achievement of the objective of nuclear disarmament,

Recalling the central role of the United Nations in the field of nuclear disarmament and in particular in the cessation of all nuclear-test explosions, as well as the persistent efforts of non-governmental organizations in the achievement of a comprehensive nuclear-test-ban treaty,

Conscious of the growing environmental concerns throughout the world and of the past and potential negative effects of nuclear testing on the environment,

Recalling its resolution 1910 (XVIII) of 27 November 1963, in which it noted with approval the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, 1/ signed on 5 August 1963, and requested the Conference of the Eighteen-Nation Committee on Disarmament 2/ to continue with a sense of urgency its negotiations to achieve the objectives set forth in the preamble to the Treaty,

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ The Committee on Disarmament was redesignated the Conference on Disarmament as from 7 February 1984.

/...

Recalling also that more than one third of the parties to the Treaty requested the Depositary Governments to convene a conference to consider an amendment that would convert the Treaty into a comprehensive test-ban treaty,

Recalling further that a substantive session of the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water was held in New York from 7 to 18 January 1991,

Reiterating its conviction that the Amendment Conference will facilitate the attainment of the objectives set forth in the Treaty and thus serve to strengthen it,

Noting with satisfaction the unilateral nuclear-test moratoria announced by several nuclear-weapon States,

Recalling its recommendation that arrangements be made to ensure that intensive efforts continue, under the auspices of the Amendment Conference, until a comprehensive nuclear-test-ban treaty is achieved,

Recalling also the decision adopted by the Amendment Conference ^{3/} to the effect that, since further work needed to be undertaken on certain aspects of a comprehensive test-ban treaty, especially those with regard to verification of compliance and possible sanctions against non-compliance, the President of the Conference should conduct consultations with a view to achieving progress on those issues and to resuming the work of the Conference at an appropriate time,

Welcoming the ongoing consultations being conducted by the President of the Amendment Conference,

1. Notes the ongoing consultations being conducted by the President of the Amendment Conference of the States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water and the special meeting of States parties of a brief duration to be held in New York in the second quarter of 1993 to review the developments on the issue of nuclear testing, with a view to examining the feasibility of resuming the work of the Amendment Conference later that year;

2. Calls upon all parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water to participate in, and to contribute to the success of, the Amendment Conference for the achievement of a comprehensive nuclear-test ban at an early date, as an indispensable measure towards implementation of their undertakings in the preamble to the Treaty;

3. Urges all States, especially those nuclear-weapon States which have not yet done so, to adhere to the Treaty;

4. Recommends that arrangements should be made to ensure the fullest possible participation of non-governmental organizations in the Amendment Conference;

^{3/} PTBT/CONF/13/Rev.1, para. 26.

5. Reiterates its conviction that, pending the conclusion of a comprehensive nuclear-test-ban treaty, the nuclear-weapon States should suspend all nuclear-test explosions through an agreed moratorium or unilateral moratoria;

6. Stresses once again the importance of ensuring adequate coordination among the various negotiating forums dealing with a comprehensive nuclear-test-ban treaty;

7. Decides to include in the provisional agenda of its forty-eighth session the item entitled "Amendment of the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water".

81st plenary meeting
9 December 1992



General Assembly

Distr.
GENERAL

A/RES/47/47
15 December 1992

Forty-seventh session
Agenda item 54

RESOLUTION ADOPTED BY THE GENERAL ASSEMBLY
[on the report of the First Committee (A/47/684)]

47/47. Comprehensive nuclear-test-ban treaty

The General Assembly,

Recalling previous resolutions that identify the complete cessation of nuclear-weapon tests and a comprehensive test ban as one of the priority objectives in the field of disarmament,

Convinced that a nuclear war cannot be won and must never be fought,

Welcoming the improved relationship between the Russian Federation and the United States of America and their consequent announcements of significant measures, including unilateral steps, which could signal the reversal of the nuclear-arms race,

Welcoming also the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms, signed on 31 July 1991, and the signing of a protocol to this Treaty in which Belarus, Kazakhstan, the Russian Federation, Ukraine and the United States of America undertake to give effect to the Treaty,

Welcoming further the Joint Understanding of 17 June 1992 between the Russian Federation and the United States of America on further reductions in their strategic offensive arms,

Welcoming the decision taken by France to suspend its testing of nuclear weapons for 1992,

Endorsing the call made by France and by the Russian Federation on the other nuclear Powers to suspend their nuclear tests,

/...

Welcoming also in addition the recent decision of the United States of America to implement a testing moratorium accompanied by a plan for achieving a multilateral, comprehensive ban on the testing of nuclear weapons,

Welcoming further the decision of the Russian Federation to extend its earlier-announced nuclear-testing moratorium,

Convinced that an end to nuclear testing by all States in all environments for all time is an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation and to contribute, along with other concurrent efforts to reduce nuclear arms, to the eventual elimination of nuclear weapons,

Noting the concerns expressed about the environmental and health risks associated with underground nuclear testing, as brought out in the Expert Study on Questions Related to a Comprehensive Test Ban Treaty in CD/1167 of 14 August 1992, which noted, inter alia, the environmental benefits and economic savings to be derived from a complete ban on nuclear testing,

Convinced also that the most effective way to achieve an end to nuclear testing is through the conclusion, at an early date, of a verifiable, comprehensive nuclear-test-ban treaty that will attract the adherence of all States,

Taking into account the undertakings by the original parties to the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water 1/ to seek to achieve the early discontinuance of all test explosions of nuclear weapons for all time, and also noting the reiteration of this commitment in the 1968 Treaty on the Non-Proliferation of Nuclear Weapons, 2/

Noting with satisfaction the work being undertaken within the Conference on Disarmament by the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, and in this context welcoming the results of the second technical test concerning the global exchange and analysis of seismic data, which will permit the system to be redesigned in the light of this experience,

Recalling that the Amendment Conference of States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water was held in New York from 7 to 18 January 1991,

Expressing its disappointment that the Conference on Disarmament was unable to re-establish the Ad Hoc Committee on item 1 of its agenda, entitled "Nuclear test ban", despite the improved political climate,

1. Reaffirms its conviction that a treaty to achieve the prohibition of all nuclear-test explosions by all States in all environments for all time is a matter of priority which would constitute an essential step in order to prevent the qualitative improvement and development of nuclear weapons and their further proliferation, and which would contribute to the process of nuclear disarmament;

1/ United Nations, Treaty Series, vol. 480, No. 6964.

2/ Ibid., vol. 729, No. 10485.

2. Urges, therefore, all States to seek to achieve the early discontinuance of all nuclear-test explosions for all time;

3. Urges:

(a) The nuclear-weapon States to agree promptly to appropriate verifiable and militarily significant interim measures, with a view to concluding a comprehensive nuclear-test-ban treaty;

(b) Those nuclear-weapon States which have not yet done so to adhere to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water;

4. Reaffirms the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty, and in this context urges the re-establishment of the Ad Hoc Committee on a Nuclear Test Ban in 1993;

5. Requests the Conference on Disarmament, in this context, to intensify its substantive work begun in 1990 on specific and interrelated test-ban issues, including structure and scope and verification and compliance, taking also into account all relevant proposals and future initiatives;

6. Urges the Conference on Disarmament:

(a) To take into account the progress achieved by the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, including the experience gained from the technical test concerning the global exchange and analysis of seismic data, and other relevant initiatives;

(b) To continue efforts to establish, with the widest possible participation, an international seismic monitoring network with a view to developing further a system for the effective monitoring and verification of compliance with a comprehensive nuclear-test-ban treaty;

(c) To investigate other measures to monitor and verify compliance with such a treaty, including on-site inspections, satellite monitoring and an international network to monitor atmospheric radioactivity;

7. Calls upon the Conference on Disarmament to report to the General Assembly at its forty-eighth session on progress made, including its recommendations on how the objectives of the Ad Hoc Committee on item 1 of its agenda, entitled "Nuclear test ban", should be carried forward most effectively towards achieving a comprehensive test-ban treaty;

8. Decides to include in the provisional agenda of its forty-eighth session the item entitled "Comprehensive nuclear-test-ban treaty".

81st plenary meeting
9 December 1992

CONFERENCE ON DISARMAMENT

CD/1179
22 January 1993

Original: ENGLISH

Mandate for an Ad Hoc Committee under agenda item 1

"Nuclear Test Ban"

(Adopted at the 637th plenary meeting on 21 January 1993)

In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final Document, the Conference on Disarmament decides to re-establish an Ad Hoc Committee under item 1 of its agenda entitled "Nuclear Test Ban".

The Conference requests the Ad Hoc Committee to continue, as a step towards achieving a comprehensive nuclear test-ban treaty, substantive work on specific and interrelated test-ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad Hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad Hoc Committee to continue the examination of the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test-ban treaty. The Ad Hoc Committee will also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events.

The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1993 session. This report should include, inter alia, the Committee's recommendations on how the objectives of the Ad Hoc Committee on agenda item 1, "Nuclear Test Ban", should be carried forward most effectively in 1994.

CONFERENCE ON DISARMAMENT

CD/1199
CD/NTB/WP.16
26 May 1993

Original: ENGLISH

LETTER DATED 26 MAY 1993 FROM THE PERMANENT REPRESENTATIVE
OF CANADA ADDRESSED TO THE SECRETARY-GENERAL OF THE
CONFERENCE ON DISARMAMENT TRANSMITTING A BOOKLET
ENTITLED "NON-SEISMIC TECHNOLOGIES IN SUPPORT
OF A NUCLEAR TEST BAN" 1/

I have received, for transmission to my CD colleagues, the booklet
entitled: "Non-Seismic Technologies in Support of a Nuclear Test Ban".

The two briefings on non-seismic technologies by Canadian experts will be
based on the contents of this booklet.

I would be grateful if you would arrange to circulate them, under a CD
number, and as a working paper of the Ad Hoc Committee on a Nuclear Test Ban,
to all members and non-members participating in the work of the Conference.

(Signed) Gerald E. Shannon
Ambassador and
Permanent Representative

1/ A limited distribution of this booklet in English only has been made
available to the members and non-members invited to participate in the work of
the Conference on Disarmament. Additional copies are available from the
Permanent Mission of Canada.

CONFERENCE ON DISARMAMENT

CD/1200/rev.1
11 June 1993

Original: English

Group of 21: draft statement*

The Conference on Disarmament,

Recalling that a comprehensive nuclear test ban has been on the agenda of multilateral fora for over thirty years,

Urges all its members and invites non-member participant States to contribute to the early attainment of a multilateral legal régime on a comprehensive nuclear test ban,

Reaffirms the particular responsibilities of the Conference on Disarmament in the negotiation of a comprehensive nuclear-test-ban treaty.

* Revised in light of the discussions in the informal meeting of the CD held on 9 June 1993.

CONFERENCE ON DISARMAMENT

CD/1201
CD/NTB/WP.18
3 June 1993

Original: ENGLISH

LETTER DATED 3 JUNE 1993 FROM THE PERMANENT REPRESENTATIVE OF CANADA
ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT
TRANSMITTING A BOOKLET ENTITLED "CONSTRAINING PROLIFERATION:
THE CONTRIBUTION OF VERIFICATION SYNERGIES" 1/

I have received, for transmission to my CD colleagues, the booklet
entitled: "Constraining Proliferation: The Contribution of Verification
Synergies".

I would be grateful if you would arrange to circulate them, under a CD
number, and as a working paper of the Ad Hoc Committee on a Nuclear Test Ban,
to all members and non-members participating in the work of the Conference.

(Signed) Gerald E. Shannon
Ambassador and
Permanent Representative

1/ A limited distribution of this booklet in English only has been made
available to the members and non-members invited to participate in the work of
the Conference on Disarmament. Additional copies are available from the
Permanent Mission of Canada.

CONFERENCE ON DISARMAMENT

CD/1202
CD/NTB/WP.19
3 June 1993

Original: ENGLISH

LETTER DATED 3 JUNE 1993 FROM THE HEAD OF THE SWEDISH
DELEGATION ADDRESSED TO THE SECRETARY-GENERAL OF THE
CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF A
DRAFT COMPREHENSIVE TEST-BAN TREATY

I have the honour to send you, enclosed, a draft Comprehensive Test-Ban Treaty, which will be introduced in the Conference on Disarmament and in the Ad Hoc Committee on a Nuclear Test Ban today. It should be noted that two protocols to the Treaty are to be added later on.

I should be grateful if the draft Treaty could be issued as an official document of the Conference as well as a Working Paper in the Ad Hoc Committee and translated into all the official languages.

(Signed) Lars Norberg
Ambassador
Head of the Swedish Delegation
to the Conference on Disarmament

DRAFT COMPREHENSIVE NUCLEAR TEST-BAN TREATY

The States Parties to this Treaty, hereinafter referred to as the "States Parties",

Convinced that recent fundamental international political changes provide opportunities to take further effective measures against the proliferation of nuclear arms,

Welcoming the conclusion of the START I and START II agreements, envisaging drastic reductions in present strategic nuclear arsenals,

Underlining the importance of the prompt implementation of these and other international disarmament and arms regulation agreements,

Stressing the need for further reductions of tactical and strategical nuclear weapons and their delivery systems,

Declaring their intention to undertake further measures towards nuclear disarmament and against the proliferation of nuclear weapons,

Recalling the determination expressed by the Parties in the Preamble to the 1963 Treaty Banning Nuclear-Weapons Tests in the Atmosphere, in Outer Space and Under Water to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time, and to continue negotiations to this end,

Recalling that the Parties in the above-mentioned Treaty undertake to prohibit, to prevent and not to carry out any nuclear-weapon test explosion, or any other nuclear explosion in the atmosphere, in outer space and under water,

Convinced that a ban on all nuclear-weapon test explosions, and any other nuclear explosions, is an important instrument in preventing the further proliferation of nuclear weapons,

Have agreed as follows:

Article I

Basic Obligations

1. Each State Party undertakes to prohibit, to prevent, and not to carry out, in any environment, any nuclear-weapon test explosion, or any other nuclear explosion at any place under its jurisdiction or control.
2. Each State Party undertakes, furthermore, to refrain from causing, encouraging, assisting, permitting or in any way participating in the carrying out anywhere of any nuclear explosion referred to in paragraph 1 of this Article.

Article II

Implementation

1. The States Parties, in order to achieve the objectives of the Treaty and to ensure the implementation of the provisions of the Treaty, entrust the International Atomic Energy Agency, hereinafter referred to as the "Agency", with verification of compliance with the Treaty, as defined in Article III B.
2. The States Parties undertake to cooperate in good faith with the Agency in the exercise of its functions in accordance with this Treaty.
3. In order to fulfil its obligations under the Treaty, each State Party shall designate or set up a National Authority and shall so inform the Agency upon entry into force of the Treaty for such a State Party. The National Authority shall serve as the national focal point for liaison with the Agency and with other States Parties.
4. Each State Party undertakes to take any measures it considers necessary to prohibit and prevent any activity in violation of the provisions of the Treaty anywhere under its jurisdiction or control.
5. Each State Party shall inform the Depositary of the legislative and administrative measures taken to implement the Treaty.

Article III

International Cooperation

A. States Parties

1. Each State Party undertakes to cooperate in good faith with each other and the Agency to facilitate the verification of compliance with this Treaty through:
 - international exchange of seismological data;
 - international exchange of measurements on radionuclides in the atmosphere;
 - additional relevant techniques, as specified in Protocol I, annexed to this Treaty.

The arrangements for these international cooperative measures are laid down in Protocol I.

Each State Party undertakes to establish the necessary facilities to participate in these cooperative measures and through its National Authority to establish the necessary communication channels with the Agency. These arrangements shall be operative on the entry into force of this Treaty.

2. Large non-nuclear explosions carried out by a State Party shall be conducted in accordance with provisions laid down in Protocol II, annexed to this Treaty.

B. The Agency

In the exercise of its functions in accordance with this Treaty, the Agency shall:

- coordinate international cooperative arrangements to exchange seismological data, data on radionuclides in the atmosphere and other data relevant to the monitoring of compliance with the Treaty;
- endeavour, through cooperation with the National Authorities of the States Parties and through other means, to clarify that no inconsistencies occur with regard to events relevant to compliance with the Treaty;
- verify, when inconsistencies are not clarified, compliance with the Treaty through on-site inspection in accordance with Article IV.

Article IV

Verification

1. Each State Party shall, in order to assist in the interpretation of an event that may be of relevance to the Treaty and has occurred at any place under its jurisdiction or control, provide such additional information that the Agency might request.
2. Each State Party may use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law to verify compliance with the Treaty.
3. If the nature of an event cannot be clarified through the measures specified in paragraphs 1 and 2 of this Article, each State Party is entitled to request an on-site inspection on the territory of any other State Party for the purpose of ascertaining whether or not a specified event was a nuclear explosion. The requesting State Party shall state the reasons for its request, including the evidence available. Such requests shall be addressed to the Director-General of the Agency, who shall bring the matter to the attention of the Board of Governors of the Agency.
4. If the Board of Governors decides to conduct an on-site inspection, the relevant State Party is under obligation to comply with the Board's decision. Such inspections shall be conducted by the Agency, and the result shall be

reported to the Board of Governors and all States Parties. The Board of Governors shall report any findings to the Security Council of the United Nations. Procedures for such inspections, including the rights and functions of the inspecting personnel, are laid down in Protocol II.

5. A State Party, on whose territory an event has occurred, may invite the Agency to conduct an on-site inspection.

Article V

Complaints

Any State Party which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Treaty, may lodge a complaint with the Security Council of the United Nations. Such a complaint shall include all possible evidence confirming its validity.

Article VI

Privileges and Immunities

1. The States Parties to this Treaty shall grant privileges and immunities to the representatives of States Parties and the Director-General and the personnel of the Agency in accordance with the Vienna Convention on Diplomatic Relations of 18 April 1961 in order to enable them to carry out the functions entrusted to them under this Treaty.

2. Provisions regarding privileges and immunities in connection with on-site inspections are contained in Protocol II.

Article VII

Annexes

The Protocols I and II to this Treaty constitute integral parts of the Treaty.

Article VIII

Amendments

1. At any time after the entry into force of this Treaty, any State Party may propose amendments to the Treaty or to any annexed Protocol. Any proposal for an amendment shall be communicated to the Depositary, who shall circulate it to all States Parties and seek their views on whether a conference should be convened to consider the proposal. If a majority, that shall not be less than thirty of the States Parties, including the nuclear-weapon States, so agree, the Depositary shall promptly convene a conference to which all States Parties shall be invited. The Conference may adopt amendments proposed, if a

majority of the States Parties present and voting, including the nuclear-weapon States, so agree. Amendments shall enter into force for each Party accepting them upon their adoption by the Conference and thereafter for each remaining Party on the date of acceptance of the amendments by such a Party.

2. Proposals for amendments of provisions of a technical nature to be specified in Protocols I and II will be subject to a simplified amendment procedure conducted and decided by the Board of Governors of the Agency.

Article IX

Review of the Treaty

Five years after the entry into force of this Treaty, or earlier if it is requested by a majority of the States Parties to the Treaty by submitting a proposal to this effect to the Depository, a conference of States Parties to the Treaty shall be held at, to review the operation of the Treaty, with a view to assuring that the purposes of the preamble and the provisions of the Treaty are being realized. Such review shall take into account any new scientific and technological developments relevant to the Treaty. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depository, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article X

Entry into force

1. This Treaty shall be open to all States for signature. Any State which does not sign this Treaty before its entry into force in accordance with this Article may accede to it at any time.

2. This Treaty shall be subject to ratification by Signatory States.

3. This Treaty shall enter into force upon the deposit of instruments of ratification by 40 Governments, including the nuclear-weapon States. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967.

4. For those States who instruments of ratification or accession are deposited after the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

Article XI

Depositary

1. The Secretary-General of the United Nations shall be the Depositary of this Treaty and shall receive the instruments of ratification and instruments of accession.
2. The Depositary shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession and the date of the entry into force of this Treaty and of any amendments thereto, any notice of withdrawal, and the receipt of other notices. He shall also inform the Security Council of the United Nations of any notice of withdrawal.
3. This treaty shall be registered by the Depositary in accordance with Article 102 of the Charter of the United Nations.

Article XII

Duration and Withdrawal

1. This treaty is of a permanent nature and shall remain in force indefinitely, provided that in the event of a violation by any party of a provision of this Treaty essential to the achievement of the objectives of the Treaty or of the spirit of the Treaty, every other Party shall have the right to withdraw from the Treaty.
2. Withdrawal shall be effected by giving notice twelve months in advance to the Depositary who shall circulate such notice to all other Parties.

Article XIII

Official Languages

This Treaty, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send duly certified copies thereof to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF, the undersigned, duly authorized thereto, have signed this Treaty.

Protocol I

(to be added)

Protocol II

(to be added)

CONFERENCE ON DISARMAMENT

CD/1204
17 June 1993

ENGLISH
Original: ENGLISH/SPANISH

LETTER DATED 17 JUNE 1993 FROM THE PERMANENT REPRESENTATIVE OF MEXICO ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A COPY OF A LETTER ON NUCLEAR TESTING SENT TO THE PRESIDENT OF THE UNITED STATES ON 14 JUNE 1993 BY THE MEMBERS OF THE PUGWASH COUNCIL ATTENDING THE 43RD PUGWASH CONFERENCE IN HASSELUDDEN, SWEDEN

In view of its indisputable interest for the members of the Conference on Disarmament, I would be grateful if you would arrange for the attached letter, published on 14 June this year during the 43rd Pugwash Conference, held in Hasseludden, Sweden, to be distributed as an official document.

(Signed): Miguel Marín Bosch
Ambassador
Permanent Representative

Geneva Office
63, rue de Lausanne
1202 Geneva
Switzerland
41 22 7383294
(Fax) 7383292

Rome Office
Accademia dei Lincei
via della Lungara 229
00165 Roma, Italy
39 6 6872606
(Fax) 6878376

London Office
63A Gt Russeil St
London WC1B 3BJ
England
44 71 4056661
(Fax) 8315651

43rd Pugwash Conference, Hasseludden, Sweden
14 June 1993

PUGWASH LETTER TO PRESIDENT CLINTON ON NUCLEAR TESTING

President Bill Clinton
The White House

Dear President Clinton:

We are writing, as all of the members of the Pugwash Council attending this year's Pugwash Conference, to urge you to extend the current U.S. moratorium on nuclear explosive tests and to reject the arguments for additional testing before conclusion of a Comprehensive Test Ban Treaty (CTBT).

We applaud your commitment to achievement of a CTBT and the embodiment of that goal in the Hatfield-Exon-Mitchell Amendment to the FY1993 Energy and Water Development Appropriation Act. We believe that a resumption of U.S. testing would delay -- and might well completely undermine -- the attainment of this critical objective. Both the delay in progress toward a CTBT and the perverse signals sent by the testing itself, moreover, would surely impair, perhaps fatally, the prospects for a positive outcome of the Non-Proliferation Treaty Extension Conference scheduled for 1995. The resulting damage to the most vital security interests of the U.S. and the world cannot possibly be compensated by the minuscule benefits ascribed to a resumption of testing by its proponents.

Let us be more specific. A resumption of U.S. testing, no matter how brief its duration or how narrow its stated purposes, would lead to:

- (i) a resumption of Russian testing, a strengthening of the position of hardliners in Russia, and the creation of a further impediment to favorable resolution of the precarious nuclear-weapons status of Ukraine;
- (ii) a resumption of French testing and a strengthening of the position of those in France who would like to block attainment of a CTBT altogether; and
- (iii) assured continuation of Chinese testing, quite possibly extending beyond 1996.

These outcomes would weaken support for and complicate the negotiation of a CTBT; would squander any leadership and influence the United States and the other declared nuclear-weapon states might otherwise hope to exert in the NPT Extension Conference; and would strengthen pro-bomb factions in nuclear-threshold states, at best reducing the chance of engaging these states in the NPT and CTBT regimes and at worst propelling them toward nuclear tests of their own.

The "benefits" being offered in exchange for these appalling consequences are said to be such improvements in the reliability, safety, and performance of U.S. and U.K. warheads as might be accomplished with the addition of 15 (or fewer) further tests beyond the thousand such explosions that these two countries have already conducted. But what reliability problems, in a U.S. nuclear arsenal numbering several thousands of warheads of well tested types, could imperil the credibility of the deterrent function this arsenal is said to serve (or, if they existed, could be resolved by just a handful of tests)? How much additional safety could a few more tests buy, after nearly fifty years of prior learning about how to make these devices safe? And if, as some have suggested, the perfection of a "new" warhead is on the testing agenda, what need for such a thing can the United States or the United Kingdom plausibly assert in the post-Cold-War world, and what are likely to be the consequences, for proliferation incentives, of asserting it?

We find it difficult to believe, Mr. President, that hidden in the classified details are rationales to persuade an objective analyst that these outwardly meager benefits of a few tests are really large enough to offset the huge costs and risks that resuming testing would entail. It seems more probable that the proponents of such a resumption are hoping for just what you and we would wish to prevent -- namely, that a few more tests will lead to a great many more, by pushing a CTBT once more out of reach. Please do not allow that to happen.

Respectfully,

Professor Joseph Rotblat (United Kingdom), President of Pugwash
 Professor Francesco Calogero (Italy), Secretary-General of Pugwash
 Professor John P. Holdren (USA), Chairman of the Pugwash Executive Committee
 Professor Maciej Nalecz (Poland), Chairman of the Pugwash Council
 Professor Ogunlade Davidson (Sierra Leone), Member of the Executive Committee
 Dr. Virginia Gamba (Argentina), Member of the Executive Committee
 Academician Vitalii I. Goldanskii (Russia), Member of the Executive Committee
 Dr. Venance Journé (France), Member of the Executive Committee
 Dr. Martin M. Kaplan (Switzerland), Member of the Executive Committee
 Professor Bhalchandra M. Udgaonkar (India), Member of the Executive Committee
 Professor Gothom Arya (Thailand), Member of the Council
 Professor Gabriel Baramki (West Bank), Member of the Council
 Professor Anna Maria Cetto (Mexico), Member of the Council
 Professor Ubiratan D'Ambrosio (Brazil), Member of the Council
 Professor Hans-Peter Duerr (Germany), Member of the Council
 General Emmanuel Erskine (Ghana), Member of the Council
 Professor Esmat Ezz (Egypt), Member of the Council
 Professor Serguei Kapitza (Russia), Member of the Council
 Professor Martin M. Kaplan (Switzerland), Member of the Council
 Professor Michiji Konuma (Japan), Member of the Council
 Mr. Sverre Lodgaard (Norway), Member of the Council
 Professor Annon Pazy (Israel), Member of the Council
 Professor Sebastian Pease (UK), Member of the Council

cc: Vice President Gore
 Secretary of State Christopher
 Secretary of Defense Aspin
 Secretary of Energy O'Leary
 National Security Advisor Lake

Presidential Science Advisor Gibbons
 Senator Exon
 Senator Hatfield
 Senator Mitchell
 Senator Nunn

CONFERENCE ON DISARMAMENT

CD/1205
CD/NTB/WP.24
20 July 1993

Original: ENGLISH

LETTER DATED 20 JULY 1993 FROM THE REPRESENTATIVE OF THE UNITED STATES OF AMERICA ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A DOCUMENT CONTAINING THE TEXT OF PRESIDENT CLINTON'S RADIO ADDRESS OF JULY 2, 1993, REGARDING HIS DECISION ON U.S. NUCLEAR TESTING POLICY

I have the honor to forward to you a document containing the text of President Clinton's radio address of July 2, 1993, regarding his decision on U.S. nuclear testing policy. The text in the document has been excerpted from a longer text dealing with other, unrelated subjects.

Could you please take the appropriate steps to register this document as an official document of the Conference on Disarmament, and to have it distributed to all member delegations and non-member states participating in the work of the Conference.

(Signed): Stephen J. Ledogar
Ambassador
U.S. Representative
to the Conference on
Disarmament

THE WHITE HOUSE

Office of the Press Secretary

July 2, 1993

RADIO ADDRESS BY THE PRESIDENT*

The Roosevelt Room

....Because of the vigilance, the democratic values, the military strength of the United States and our allies, we won the Cold War. Our inheritance, our victory is a new chance to rebuild our economies and solve our problems in each of our countries while we reduce military spending. But our profound responsibility remains to redefine what it means to preserve security in this post-Cold War era. We must be strong. We must be resolute. And we must be safe.

This great task has certainly changed with the passage of the Cold War. The technologies of mass destruction in the hands of Russia and the United States are being reduced. But technologies of mass destruction that just a few years ago were possessed only by a handful of nations, and still are possessed only by a few, are becoming more widely available. It is now theoretically possible for many countries to build missiles, to have nuclear weapons and other weapons of mass destruction. This is a new and different challenge that requires new approaches and new thinking.

During my campaign for President, I promised a wholehearted commitment to achieving a comprehensive nuclear test ban treaty. A test ban can strengthen our efforts worldwide to halt the spread of nuclear technology in weapons. Last year, the Congress directed that a test ban be negotiated by 1996. And it established an interim moratorium on nuclear testing while we reviewed our requirements for further tests. That moratorium on testing expires soon.

Congress said that after the moratorium expires, but before a test ban was achieved, the United States could carry out up to 15 nuclear tests to ensure the safety and reliability of our weapons. After a thorough review, my administration has determined that the nuclear weapons in the United States arsenal are safe and reliable.

Additional nuclear tests could help us prepare for a test ban and provide for some additional improvements in safety and reliability. However, the price we would pay in

(* Excerpt from broadcast)

conducting those tests now by undercutting our own nonproliferation goals and ensuring that other nations would resume testing outweighs these benefits.

I have, therefore, decided to extend the current moratorium on United States nuclear testing at least through September of next year, as long as no other nation tests.

And I call on the other nuclear powers to do the same. If these nations will join us in observing this moratorium, we will be in the strongest possible position to negotiate a comprehensive test ban and to discourage other nations from developing their own nuclear arsenals.

If, however, this moratorium is broken by another nation, I will direct the Department of Energy to prepare to conduct additional tests while seeking approval to do so from Congress. I therefore expect the Department to maintain a capability to resume testing.

To assure that our nuclear deterrent remains unquestioned under a test ban, we will explore other means of maintaining our confidence in the safety, the reliability and the performance of our own weapons. We will also refocus much of the talent and resources of our nation's nuclear labs on new technologies to curb the spread of nuclear weapons and verify arms control treaties.

Beyond these significant actions, I am also taking steps to revitalize the Arms Control and Disarmament Agency, so that it can play an active role in meeting the arms control and nonproliferation challenges of this new era. I am committed to protecting our people, deterring aggression and combatting terrorism. The work of combatting proliferation of weapons of mass destruction is difficult and unending, but it is an essential part of this task. It must be done....

(End of excerpt)

CONFERENCE ON DISARMAMENT

CD/1208
27 July 1993

ENGLISH
Original: SPANISH

LETTER DATED 22 JULY 1993 FROM THE PERMANENT REPRESENTATIVE OF VENEZUELA ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF A COMMUNIQUE ISSUED BY HIS GOVERNMENT IN CONNECTION WITH THE EXTENSION OF THE EXISTING MORATORIUM ON NUCLEAR TESTING

I have pleasure in forwarding to you the attached communique from the Government of Venezuela relating to the decision adopted by the United States, the Russian Federation and France to extend the moratorium they have voluntarily and unilaterally placed on their nuclear testing programmes, as well as the intention expressed by the United Kingdom of Great Britain and Northern Ireland to do likewise.

I would be very grateful if this text could be published as an official document of the Conference on Disarmament and distributed to all delegations, both of member States and of non-member States participating in this multilateral negotiating forum.

(Signed): Horacio Arteaga
Ambassador
Permanent Representative

COMMUNIQUE

The Government of Venezuela welcomes the decision taken by the Governments of the United States of America, the Russian Federation and France to extend the moratorium they have voluntarily and unilaterally placed on their nuclear testing, as well as the intention expressed by the United Kingdom of Great Britain and Northern Ireland to associate itself with this decision. This moratorium, which has been observed by these countries since last year, opens the path towards fulfilment of the undertaking entered into by the above-mentioned Powers in the preamble to the 1963 partial test-ban Treaty and in the preamble to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons.

Venezuela, which, in keeping with its policy favouring general and complete disarmament, possesses no nuclear weapons, reaffirms the importance of the earliest possible conclusion of a complete nuclear-test-ban treaty as a decisive step that can put an end to the cycle of the development and production of these aggressive systems.

Venezuela notes with optimism this process that should lead to the total cessation of nuclear testing, and expresses its keen wish that the nuclear Powers should adopt more effective measures in pursuit of nuclear disarmament and the elimination of existing nuclear arsenals.

AUSTRALIA, MEXICO and NIGERIA: Draft decision

The Conference on Disarmament,

Taking note of recent initiatives regarding the negotiation of a comprehensive nuclear-test-ban treaty (CTB),

Convinced that, to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects and therefore to the enhancement of international peace and security, a CTB should be universal and internationally verifiable,

Convinced further that, in order to achieve this goal, it is essential that a CTB be, from the outset, multilaterally negotiated in all its aspects, including its verification provisions,

Stresses that, as the sole multilateral negotiating forum of the international community in the field of disarmament, it has the primary responsibility to negotiate a CTB,

Decides to review the mandate of the Ad Hoc Committee on NTB in order to allow it to undertake forthwith the negotiation of a CTB;

Requests the Ad Hoc Committee on NTB to make the necessary arrangements to continue this negotiation immediately after the end of the present session.

CONFERENCE ON DISARMAMENT

CD/1210
4 August 1993

Original: ENGLISH

LETTER DATED 4 AUGUST 1993 FROM THE PERMANENT REPRESENTATIVE OF INDONESIA ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A MESSAGE FROM MR. ALI ALATAS, MINISTER FOR FOREIGN AFFAIRS OF INDONESIA AND PRESIDENT OF THE AMENDMENT CONFERENCE OF STATES PARTIES TO THE TREATY BANNING NUCLEAR WEAPON TESTS IN THE ATMOSPHERE, IN OUTER SPACE AND UNDER WATER ON THE OCCASION OF THE 30TH ANNIVERSARY OF THE SIGNING OF THE TREATY

I have the honour to submit to you a document containing the message from Mr. Ali ALATAS, Minister for Foreign Affairs of the Republic of Indonesia and President of the Amendment Conference of States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water on the Occasion of the 30th Anniversary of the Signing of the Treaty.

It would be highly appreciated, if you could take the necessary steps to include this document as an official document of the Conference on Disarmament and at the same time to make it available to all member and non-member states, participating in the Conference on Disarmament.

Geneva, 4 August 1993.

(Signed): Soemadi D.M. BROTDININGRAT

MESSAGE

BY H.E. MR. ALI ALATAS
MINISTER FOR FOREIGN AFFAIRS
OF THE REPUBLIC OF INDONESIA
AND
PRESIDENT OF THE AMENDMENT CONFERENCE
OF STATES PARTIES TO THE
TREATY BANNING NUCLEAR WEAPONS TESTS
IN THE ATMOSPHERE, IN OUTER SPACE
AND UNDER WATER
ON THE OCCASION OF THE 30TH ANNIVERSARY
OF THE SIGNING OF THE TREATY

Today, the world commemorates the 30th anniversary of the signing of the Treaty Banning Nuclear Tests in the Atmosphere, in Outer Space and Under Water. Widely known as the Partial or Limited Test Ban Treaty, it was rightly hailed as a trailblazing event. Although the Treaty left much room for improvement by not banning underground nuclear test explosions, it was nonetheless a historic milestone in nuclear arms control and disarmament because it was the first agreement between the rival nuclear powers. To encourage this positive development, dozens of non-nuclear weapon states, including my own country, Indonesia, signed on to the Treaty within weeks after it was concluded.

This anniversary is special not because it marks a long passage of time, but because we observe it when, for the first time since the Treaty was signed, silence reigns at the nuclear weapon test sites. Today more than ever before, there is hope that the Treaty's promise of a total test ban will be finally fulfilled.

In 1988, on the 25th anniversary of the Treaty, Indonesia and five other members states of the United Nations, launched an effort to amend and to convert the 1963 Treaty into a comprehensive test ban treaty. That effort was propelled as much by a keen sense of exigency as by hope. After we and the other

non-nuclear weapon States Parties to the Treaty had waited in vain for a quarter of a century for the nuclear-weapon states to act on their own promise to do so, the only viable recourse left was to initiate the amendment process in accordance with the Treaty's provisions.

Thus in January 1991, I had the honour of presiding over the Amendment Conference. Our hope of bringing the Amendment process to its completion, however, could not be realized then, but the collective determination of the participants of the Conference was enough to at least prevent its outright termination.

The 1991 Conference empowered its President to consult with the Parties to the Treaty to determine an appropriate time to resume its work. Accordingly and pursuant to General Assembly Resolution 47/46, I shall convene a special meeting of the States Parties to the Treaty on 10 - 11 August 1993 in New York, expressly for the purpose of examining the feasibility of reconvening the Amendment Conference later this year. It will be a privilege for me to receive the guidance of the States Parties on this matter.

I feel that this thirtieth year of the Treaty which has begun so hopefully should not come to an end without a concerted effort by the international community to finish the work begun three decades ago by U.S. President Kennedy, Soviet Premier Khrushchev, and British Prime Minister Macmillan. If the will of the Parties is to hold a second session of the Amendment Conference, I shall do everything in my power to ensure that it will be a fitting and propitious occasion for the nations of the world to reaffirm the pledge enshrined in the 1963 Treaty to "seek the discontinuance of all test explosions of nuclear weapons in all spheres for all time".

CONFERENCE ON DISARMAMENT

CD/1211
10 August 1993

Original: ENGLISH

PROGRESS REPORT TO THE CONFERENCE ON DISARMAMENT ON THE THIRTY-SIXTH SESSION OF THE AD HOC GROUP OF SCIENTIFIC EXPERTS TO CONSIDER INTERNATIONAL COOPERATIVE MEASURES TO DETECT AND IDENTIFY SEISMIC EVENTS

1. The Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events, initially established in pursuance of the decision taken by the Conference of the Committee on Disarmament on 22 July 1976, held its thirty-sixth formal session from 26 July to 6 August 1993, in the Palais des Nations, Geneva, under the Chairmanship of Dr. Ola Dahlman of Sweden. This was the twenty-eighth session of the Group, convened under its new mandate by the decision of the Committee on Disarmament at its 48th meeting on 7 August 1979.
2. The Ad Hoc Group is open to all member States of the Conference on Disarmament. It is also open on a standing basis to all non-member States which have been invited upon their request by the Conference on Disarmament to participate in its work. Accordingly, scientific experts and representatives of the following member States of the Conference on Disarmament participated in the session: Australia, Belgium, Canada, China, Egypt, France, Germany, Hungary, India, Indonesia, Italy, Japan, Mexico, Netherlands, Pakistan, Peru, Romania, Russian Federation, Sweden, United Kingdom of Great Britain and Northern Ireland and the United States of America.
3. Scientific experts and representatives from the following non-member States of the Conference on Disarmament participated in the session: Austria, Czech Republic, Finland, New Zealand, Norway, South Africa, Spain and Switzerland.
4. During the session 43 papers containing information on national investigations related to the work of the Group were presented by experts from: Australia, Austria, Canada, Czech Republic, Egypt, Finland, France, Germany, Italy, Japan, Netherlands, Norway, Peru, Romania, Russian Federation, South Africa, Spain, Sweden, United Kingdom and United States of America.
5. The Ad Hoc Group conducted in-depth discussions on the reassessment of the concept of a global system for the exchange of seismic data worked out in its Fifth Report (CD/903), its Sixth Report (CD/1144) and its Report on the Evaluation of GSETT-2 (Conference Room Paper 228). These discussions

were based on material prepared by working groups of participating experts. Several of these working groups thereby finalized their work. The discussions were focused on the overall design and plans for future testing of the concept. A summary of these elaborations is annexed to this progress report.

6. The Ad Hoc Group discussed the schedule and plans for developing, testing and evaluating an experimental International Seismic Monitoring System. This effort, referred to as GSETT-3, is already under way, and builds upon key elements developed in previous tests. The GSETT-3 exercise has three primary objectives that distinguish it from previous tests. These objectives are to:

(a) Develop and test new concepts for an experimental International Seismic Monitoring System, building upon previous experience;

(b) Provide a practical basis upon which to furnish the Conference on Disarmament with timely technical information;

(c) Develop an experimental system that can evolve and adapt to support future requirements that may be required by the Conference on Disarmament.

The current plans call for the full-scale phase of GSETT-3 to begin by 1 January 1995. The Group has adopted a schedule to meet this date as follows:

1993	Define technical concepts
	Begin implementation of station and communications network
	Begin development of experimental International Data Centre
	Begin development and implementation of national facilities
	Begin initial, continuous test operations of the experimental system
1994	Finalize elements of the experimental system
	Finalize participation of countries and stations
	Continue build-up of test operations
1995	Begin full-scale tests
	Begin evaluation of performance.

Those countries which have stations that will form part of the experimental network are urged to make a formal commitment to contribute these facilities in GSETT-3.

7. The Ad Hoc Group agreed to establish working groups to deal with the planning, operation and evaluation of GSETT-3.

8. The Ad Hoc Group discussed cost estimates of the system planned for GSETT-3. The Group noted that the global seismic network being planned for testing draws heavily on prior investments in seismic facilities built on a national basis. An analysis of the costs for GSETT-3 is attached as annex 2. The cost of the eventual system to be tested depends on a number of factors governing the implementation of the future system. Some of the key factors are provided in this annex. Additional guidance on these factors will need to be provided by the Conference on Disarmament before refinements to the cost estimates can be made.

9. The Ad Hoc Group noted with appreciation the convening of two informal technical meetings since its previous session. The first meeting was hosted by Italy in Rome from 1 to 3 March 1993 and had as its purpose to consider seismological procedures. The second meeting was convened by the United States in Lansdowne, Virginia from 29 June to 2 July 1993, to consider issues to assist the Ad Hoc Group in its planning for GSETT-3. Many participants of the Group were able to attend and contribute to these meetings. This aided in the Group's continued work.

10. The Ad Hoc Group received and appreciated briefings from individual delegations on the activities of the Ad Hoc Committee on a Nuclear Test Ban. The Group agreed to invite the Chairman of the Ad Hoc Committee to its next session to give presentations on issues dealt with by the Committee that are relevant to the work of the Ad Hoc Group.

11. The Ad Hoc Group appreciated the offer by Dr. Gerald Duma of Austria to act as a contact person to maintain informal contact with the International Atomic Energy Agency (IAEA).

12. The Group received and discussed a number of proposals for work in the areas of seismic event identification methods, non-seismological monitoring techniques, and for the expansion of the mandate so as to include the consideration of non-seismic methods. No consensus was reached on these proposals. It was agreed that informal consultations would be carried out on these subjects under the aegis of the Chairman and reported upon at the next session of the Group.

13. The Ad Hoc Group suggests that its next session be convened from 7-18 February 1994 in Geneva, or at a date that is most responsive to the needs of the Conference on Disarmament. In addition, the Ad Hoc Group recognizes that, depending on the activities of the Conference on Disarmament, it may become necessary to meet more frequently than in the past.

Annex 1

TESTING AN EXPERIMENTAL INTERNATIONAL
SEISMIC MONITORING SYSTEM (GSETT-3)

1. Objectives

An important goal of the Group of Scientific Experts (GSE) is to develop scientific and technical concepts for an International Seismic Monitoring System (ISMS) and to test these concepts in practical operation.

Following the successful conduct of GSETT-2, and with experience gained from that test, the original concept for an ISMS has been revised. This revision has also taken into account emerging new technologies, some of which were tested during GSETT-2.

The GSE is now planning the development, testing and evaluation of an experimental ISMS. The experimental system should be able to evolve and adapt to support future CD requirements for monitoring a nuclear test ban. It will further provide a practical basis upon which to furnish the CD with the timely technical information required for its deliberations on monitoring and verification.

2. Overall concept and design

This section gives a general overview of the concept and design of the ISMS as envisaged by the GSE. During GSETT-3, the GSE intends to test an experimental ISMS that matches as closely as possible these design concepts.

The essential features of ISMS are to:

- Ensure prompt and convenient provision of reliable data to all participating States for their national verification purposes;
- Provide a cost-efficient service to all participating States;
- Provide rapid acquisition and processing of data from a global network of stations at a central processing facility;
- Provide as much automation as possible in the collection, processing and distribution of data;
- Provide a permanent archive of all data collected or generated by the system;
- Provide data security and quality control;
- Provide an architecture which will permit modifications and improvements as they are judged desirable.

The infrastructure of the ISMS is flexible enough to incorporate the collection, archiving and distribution of data from non-seismic techniques, for example, radioactivity, hydroacoustics and infrasound.

There are three main elements of the envisaged ISMS:

(a) A global network of stations

The Alpha stations consist primarily of arrays, with some three-component stations, and are designed and located to provide detection of seismic events throughout the world. The station waveform data are telemetered continuously to the International Data Centre (IDC), either directly or through an NDC. The NDC should record the station waveforms and log the IDC access to the station to corroborate the data reliability and enable the IDC to recover lost data when communication links fail. Alpha stations should meet GSE criteria for sensitivity, instrumental response, recording hardware and software, operation and management.

The Beta stations provide data supplementary to that provided by the Alpha stations, so that events can be located with improved accuracy. Beta stations are primarily three-component stations, with some arrays. GSE standards for these stations may not be as stringent as for the Alpha stations. Though not telemetered continuously to the IDC, waveform segments can be retrieved automatically by the IDC or by NDCs from continuous data archives at National Data Centres (NDCs) or the individual stations.

Participating States may also make available supplementary data (gamma data) from national and regional networks that are not formally part of the ISMS. Stations are maintained to national standards. Gamma data are available on request, although rapidity of response may vary from one network to another. The IDC will make use of these data according to standard procedures agreed to by the GSE.

(b) National Data Centres (NDCs)

NDCs are the primary users of data from the ISMS to support national verification needs. NDCs (or cooperative regional facilities, in some cases) operate and maintain Alpha and Beta stations according to GSE standards and procedures. The NDCs are responsible for the collection of continuous data from the alpha stations and for ensuring that such data are transmitted to the IDC. Communication links are operated to ensure availability of data to the IDC. Automatic access to Beta data may be at NDCs or at the stations themselves. Gamma data are compiled at the NDCs and submitted to the IDC.

(c) International Data Centre (IDC)

The IDC collects waveform data from Alpha stations (by continuous telemetry) and from Beta stations (as segments, retrieved automatically), and processes these data to produce and distribute a daily bulletin. Automation is incorporated in the IDC's procedures to the greatest extent

possible. All data are authenticated and archived for open access by any participating State. The IDC also collects other seismological information (gamma data) from NDCs. It monitors calibration of the Alpha and Beta stations, and ensures quality control of data.

3. Station requirements

The GSE has defined the minimum technical specifications that should be covered by so-called "ISMS-standard" stations. This does not necessarily mean that these facilities consist of identical technical components, but the components of these systems must meet basic functional and technical requirements. During GSETT-3 as many participating stations as possible should conform to these ISMS standards.

For the instrumentation of such systems the following general design requirements should be taken into consideration: modularity; flexibility; reliability; robustness; incorporation of widely used components; and, low power consumption.

If the selection of the technical components follow these criteria, instruments can be configured in many ways covering the full range from three-component to array stations. Thus, an ISMS station could be tailored to the local conditions and be coupled to the network configuration to produce a uniform detection threshold for monitoring.

An ISMS-standard three-component station would consist of the following elements:

- Three-component broadband seismometers;
- A data acquisition system with digitizers to convert the seismometer output signals into digital form and modules for placing authentication signatures in the data stream;
- Electronics for very accurate synchronization to Universal Time;
- A system for transmitting data to the IDC, either directly or through an NDC (Alpha stations only) or responding to IDC requests for data (Beta stations), as well as for managing the flow, calibration, and archival of the data;
- Devices for data archiving;
- Communication interfaces for data transmission to NDCs and IDC; and
- Data channels for additional input signals (e.g. wind indicators, temperature, and other environmental data) and station status indicators.

Some of the data handling facilities may be at the NDC rather than at the station.

An ISMS-standard array station would consist of all the elements above plus additional vertical component short-period sensors distributed to enhance the signal-to-noise ratio and to provide azimuth and phase identification information. During GSETT-2 the GSE found that arrays were especially effective in detecting small seismic events, both at regional and teleseismic distances.

The station requirements are summarized in table 1.

4. Network definition for the experimental system

Based on experience from previous tests and from results of computer simulation, the GSE proposes that the experimental system should contain a network of 53 Alpha stations and more than 100 Beta stations. The proposed Alpha station locations are shown in figure 1 and the countries are listed in table 2. Twenty-seven of these stations are of the array type and 26 are three-component stations. In the actual station implementation, the locations of some of these stations may be moved with reference to conditions in each country.

From figure 1 it is seen that most of the proposed stations already exist. Some stations conform already with ISMS standards, whereas some will need to be upgraded.

5. Requirements for the experimental IDC

The United States has offered to build and operate an experimental IDC near Washington, D.C. The products and services of the experimental IDC will include:

- an automatically produced event list based on Alpha station data within one hour;
- an automatically produced event list based on Alpha and Beta station data within four hours;
- a final, analyst-reviewed event bulletin within two days.

The IDC should keep an archive of all waveforms and all other data received, all event lists and bulletins produced, event bulletins received from national and regional networks for events detected by the alpha network, detection lists, station information, calibration, travel-time curves, amplitude-distance curves, etc.

The IDC should be an open facility, and all data and processing results should be available to participants for automatic and easy access. Data and processing results not older than 15 days should be available for on-line access, requests should be responded to automatically and promptly, and data older than 15 days should be available within 24 hours.

The IDC should monitor the status of stations and communications within the global system and provide feedback to the stations.

The procedures used at the experimental IDC should follow, as far as possible, the procedures currently envisaged for the eventual IDC. Thus, the procedures should be validated, well documented and follow strict rules and schedules, they should be as automatic as possible and contain (as a goal) no subjective judgement.

Data and results should be stored in the IDC-database and should be reliable and authenticated.

All procedures should be secure and repeatable so that results could be reproducible.

There should be sufficient redundancy in the IDC-system, at least 99 per cent functionality will be required, the time schedule must be adhered to.

The IDC Analysis Software should be available to the participants so that they can repeat the analysis.

The IDC should provide the participants with user support and computing capabilities.

It should be possible to implement improvements to the IDC software easily and rapidly.

It should be possible to incorporate new scientific methods and technological advancements.

The work should be a joint international effort.

6. Schedule of implementation and testing

Most of the Alpha stations which the GSE considers should form part of the experimental network exist today. The GSE intends to seek the support of the actual countries in contributing those stations to the experimental network and to the test. A number of new stations will have to be established and the GSE hopes that this can be achieved through national or cooperative international efforts. Modern, high-speed communication links will need to be established for both the Alpha and Beta stations in the experimental network. The GSE foresees a gradual establishment of the network by adding stations when they are completed or made available.

The introduction of the Beta-stations will also be by a step-by-step procedure and the Group will make further decisions as to the beta-network once it is clear which stations participating countries will contribute to this network.

The Group appreciates the offer by the United States to develop and operate an experimental IDC. The work to establish and test this IDC is under way and stations are being connected on a case-by-case basis.

A plan to conduct an acceptance test in 1994 of the IDC is being developed. The purpose of this acceptance test is to verify that the IDC meets the GSE requirements set forth for the experimental ISMS.

The GSE envisages that full-scale global testing of the experimental international seismic monitoring system can commence on 1 January 1995.

Table 1

STATION REQUIREMENTS FOR AN ISMS STANDARD STATION

Category	Requirement
Pass Band	.02-20 Hz (Alpha and Beta)*
Seismometer Noise	10 dB below Petersons low earth noise model
Calibration	within 5% in amplitude and 5° in phase
Sample Rate	40 samples per second ($\pm 50 \mu s$)
Resolution	18 dB below Petersons low noise model
Sensitivity	200 counts/nm @ 3 Hz
System Noise	10 dB below Petersons low earth noise curve
Dynamic Range	126 dB
Linearity	90 dB over the pass band
Timing Accuracy	1 ms (Network standard timing required)
Operating Temperature	-10° C to 45° C
Authentication	required
State of Health	a minimum of clock status, calibration status, and vault status
Format	must be one of the official GSE formats
Protocol	TCP/IP (beta)
Delay in Transmission	< 15 seconds
Data Frame Length	< 1 second
Data Access	Priority given to IDC, then NDC
Disk Buffer	7 days
Data Availability	greater than 99%
Timely Data Transmission	greater than 98%
Station Location	known within 100 m; relative location of array elements
	known to within 1 metre
Seismometer Orientation	known within 1 degree

* 8.0 hertz for stations with "unique" capabilities

Table 2

Participation in GSETT-3, Current Status -- August 1993
The table is based on national working papers submitted to the GSE

Country/Region	Alpha Stations		Beta Stations	Gamma Data	NDC
	Proposed	Committed	Committed	Committed	Committed
Antarctica	3	1	0	-	-
Argentina	1	0	0	-	-
Australia	4	4	10-15	No	No
Austria	-	-	1	Yes	Yes
Belgium	-	-	0	No	No
Bolivia	1	0	0	No	No
Botswana	1	0	0	No	No
Brazil	1	0	0	No	No
Canada	3	0	0	No	No
Can. Afr. Republic	1	0	0	No	No
China	3	0	0	No	No
Czech Republic	-	-	1	No	No
Denmark	1	0	0	No	Yes
Egypt	1	1	0	No	No
Finland	1	1	4	No	Yes
France	-	-	1	Yes	Yes
Germany	1	0	0	No	Yes
Hungary	-	-	0	No	No
India	1	0	0	No	No
Indonesia	1	0	0	No	No
Italy	-	-	1-2	Yes	Yes
Ivory Coast	1	0	2-5	Yes	Yes
Japan	1	1	0	No	No
Kazakhstan	1	0	0	Yes	Yes
S. Korea	1	0	0	No	No
Kenya	1	0	0	No	No
Netherlands	-	-	0	No	No
N. Africa (XAF)	1	0	1	Yes	Yes
New Guinea	1	0	0	-	-
New Zealand	-	-	0	No	No
Norway	3	3	2	Yes	Yes
Pakistan	1	0	1	No	Yes
Paraguay	1	0	0	No	No
Peru	-	-	0	No	No
Romania	-	-	1	Yes	Yes
Russian Rederation	5	3	1	Yes	Yes
S. America (XSA)	1	0	6	No	Yes
South Africa	1	1	0	-	-
Spain	1	1	1	Yes	Yes
Sweden	-	-	0	Yes	Yes
Switzerland	-	-	0	No	No
Thailand	1	0	0	No	No
Turkey	1	0	0	No	No
Turmenistan	1	0	0	No	No
United Kingdom	-	-	1	No	No
United States	6	6	15-25	Yes	Yes
TOTAL	53	22	49-68	13-Yes	19-Yes

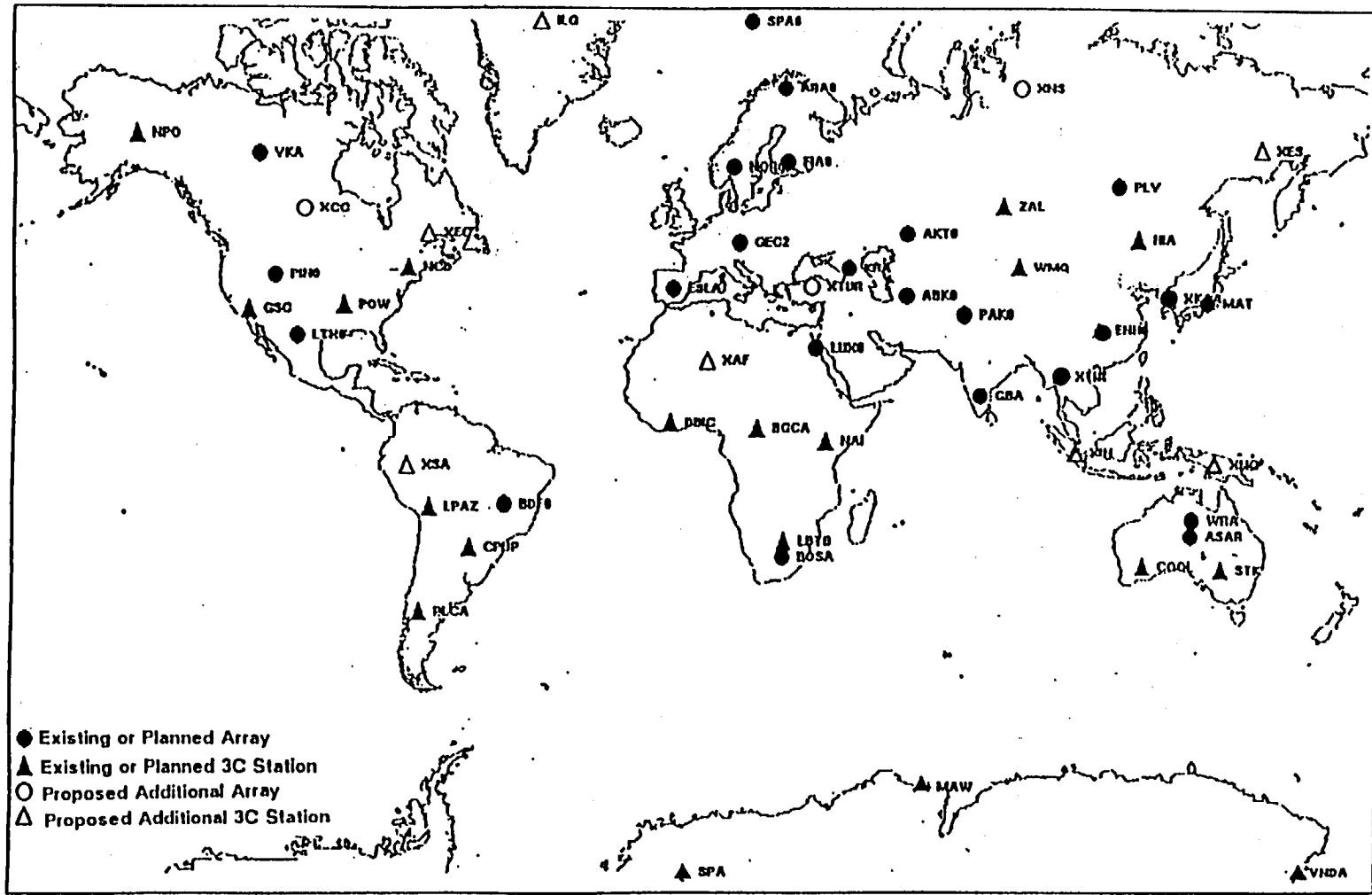


Figure 1. Preliminary GSETT-3 alpha network. The filled symbols represent existing or planned stations. The open symbols denote additional stations that are proposed to be located in certain general geographical regions so as to improve the global coverage. The additional stations could be chosen either from existing stations or by installation of new facilities.

Annex II

REPORT ON "COST ESTIMATES"

This report provides an outline of the steps that will be required to determine a cost-performance relationship for the operation of an international seismic monitoring system under a Comprehensive Nuclear Test Ban. First, an initial cost estimate is provided for GSETT-3, including the cost of equipment that has already been developed under the previous GSE exercises and other national seismic programs. Second, the range of costs are provided for individual seismic installations that could be needed in any future international CTB monitoring network. Third, a list of questions are provided which will need to be answered before realistic estimates of the cost of a CTB international seismic monitoring system can be given.

1. GSETT-3: Since the seismic system for GSETT-3 has not yet been precisely defined, it is premature to give final cost estimates. The total cost will not be known until the experiment is completed. However, considering that a fairly long lead time is required for building and upgrading some new stations, the following provides initial estimates for the exercise.

The global seismic network being planned for the test draws heavily on prior investments in seismic facilities built on a national basis. From costs provided by GSE participants, these investments are roughly estimated to have been 150 MUSD. In addition to these investments, there are additional new costs associated with the planned test. These additional costs include new investments in seismic stations and arrays, communications from these seismic facilities to the International Data Center, and the annual operational cost of the stations, national data centres, and the International Data Center. These estimates of the new costs were developed using information provided by the United States, Sweden, and Japan.

Assumptions on the overall configuration of the GSETT-3 exercise

- Alpha Network

(i) 30 arrays and 20, 3-component stations.

Among them 5 new arrays are to be built and 15 stations are to be upgraded.

Currently available facilities are to be utilized as much as possible.

(ii) One IDC will be used.

- Beta Network

(i) Number of Beta stations: about 100

Rough Total Cost Estimates

- Total of past investment and new investment: about 170 MUSD
- Total operating costs: 26 MUSD/year

Rough Costs of Individual GSETT-3 Elements

- For Alpha Network
New investment: 12 MUSD
Running cost (including comms): 12 MUSD/year
- IDC:
New investment: 3 MUSD
Running cost: 6 MUSD/year
- For Beta Network:
New investment: 4 MUSD
Running cost (including comms): 8 MUSD/year

2. The range of costs for individual seismic installations which could be required by an international seismic monitoring network:

- Seismic Arrays:
New investment: 1 MUSD - 10 MUSD
Running cost (including comms): 50 KUSD/year to 500 KUSD/year
- Three Component Seismic Stations:
New investment: 200 KUSD - 2 MUSD
Running cost (including comms): 20 KUSD/year to 450 KUSD/year.

3. Additional Information that is Required for Estimating Future Costs:

Upon the completion and evaluation of GSETT-3, we will know the true cost of operating an experimental network of proven capability, and we will be able to compare these to our initial theoretical estimates. In addition, before reasonable estimates can be given for the costs and capabilities of future networks, the following information, which depends on political decisions, will be needed. Depending on the answers to the following questions, the cost estimate could vary by as much as an order of magnitude.

- (i) The monitoring strategy in the placement and number of stations
 - equal coverage or "areas of high interest"
- (ii) The cost of maintaining a high - reliability network
 - redundancy in sensors and communication
- (iii) The monitoring requirement of confidence in event detection
 - either high or low at a particular seismic magnitude level
- (iv) The administrative overhead of running an IDC - this cost could easily exceed the technical costs.
- (v) The costs borne by individual countries in running their network and NDC in a operational mode, including the costs of refurbishing elements of their network over time.
- (vi) The cost of facility security and data authentication.

CONFERENCE ON DISARMAMENT

CD/1212
10 August 1993

Original: ENGLISH

Decision on agenda item 1 "Nuclear Test Ban"
adopted by the Conference on Disarmament at
its 659th plenary meeting on 10 August 1993

The Conference on Disarmament,

Taking note of initiatives regarding the negotiation of a comprehensive nuclear test ban treaty (CTB),

Convinced that, to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects, to the process of nuclear disarmament and therefore to the enhancement of international peace and security, a CTB should be universal and internationally and effectively verifiable,

Convinced further that, in order to achieve this goal, it is important that a CTB be multilaterally negotiated,

Stressing that, as the sole multilateral disarmament negotiating forum of the international community, it is the appropriate forum for negotiating a CTB,

Decides to give its Ad Hoc Committee on a Nuclear Test Ban a mandate to negotiate a CTB;

Requests the Chairman of its Ad Hoc Committee on a Nuclear Test Ban to make the necessary arrangements to conduct consultations during the period between 3 September 1993 and 17 January 1994 on the specific mandate for, and the organization of, the negotiation.

CONFERENCE ON DISARMAMENT

CD/1220
24 August 1993

Original: ENGLISH

REPORT OF THE AD HOC COMMITTEE ON A NUCLEAR TEST BAN

I. INTRODUCTION

1. At its 637th plenary meeting on 21 January 1993, the Conference on Disarmament agreed to re-establish an ad hoc committee under item 1 of its agenda entitled "Nuclear Test Ban" (CD/1180), with the mandate resulting from the 1992 consultations conducted by the special coordinator on this item, contained in CD/1179, as follows:

"In the exercise of its responsibilities as the multilateral disarmament negotiating forum in accordance with paragraph 120 of the Final Document, the Conference on Disarmament decides to re-establish an Ad Hoc Committee under item 1 of its agenda entitled 'Nuclear Test Ban'.

The Conference requests the Ad Hoc Committee to continue, as a step towards achieving a comprehensive nuclear test-ban treaty, substantive work on specific and interrelated test-ban issues, including structure and scope as well as verification and compliance.

Pursuant to its mandate, the Ad Hoc Committee will take into account all existing proposals and future initiatives. In addition, it will draw on the knowledge and experience that have been accumulated over the years in the consideration of a comprehensive test ban in the successive multilateral negotiating bodies and the trilateral negotiations.

The Conference also requests the Ad Hoc Committee to continue the examination of the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network as part of an effective verification system of a nuclear test-ban treaty. The Ad Hoc Committee will also take into account the work of the Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events.

The Ad Hoc Committee will report to the Conference on Disarmament on the progress of its work before the conclusion of the 1993 session. This report should include, *inter alia*, the Committee's recommendations on how the objectives of the Ad Hoc Committee on agenda item 1, 'Nuclear Test Ban', should be carried forward most effectively in 1994."

2. At its 659th plenary meeting on 10 August 1993, the Conference adopted the following decision on agenda item 1 (CD/1212):

"The Conference on Disarmament,

Taking note of initiatives regarding the negotiation of a comprehensive nuclear test ban treaty (CTB),

Convinced that, to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects, to the process of nuclear disarmament and therefore to the enhancement of international peace and security, a CTB should be universal and internationally and effectively verifiable,

Convinced further that, in order to achieve this goal, it is important that a CTB be multilaterally negotiated,

Stressing that, as the sole multilateral disarmament negotiating forum of the international community, it is the appropriate forum for negotiating a CTB,

Decides to give its Ad Hoc Committee on a Nuclear Test Ban a mandate to negotiate a CTB;

Requests the Chairman of its Ad Hoc Committee on a Nuclear Test Ban to make the necessary arrangements to conduct consultations during the period between 3 September 1993 and 17 January 1994 on the specific mandate for, and the organization of, the negotiation."

3. At the same meeting, the Chairman of the Ad Hoc Committee announced that he would proceed without delay to make the necessary arrangements for the consultations he was requested to conduct by the Conference.

II. ORGANIZATION OF WORK AND DOCUMENTATION

4. At the 639th plenary meeting on 28 January 1993, the Conference on Disarmament appointed Ambassador Yoshitomo Tanaka of Japan as Chairman of the Ad Hoc Committee. Mr. Michael Cassandra of the United Nations Office for Disarmament Affairs served as Secretary.

5. As it had announced in May 1992, the delegation of France participated for the first time in the work of the Ad Hoc Committee. France's decision to participate was widely welcomed in the Ad Hoc Committee.

6. In accordance with the decision of the Conference adopted at its 603rd plenary meeting on 22 August 1991, the Ad Hoc Committee was open to all the non-member States invited by the Conference to participate in its work.

7. The Ad Hoc Committee held 19 meetings from 18 February to 24 August 1993. In addition, the Chairman conducted a number of informal consultations with delegations.

8. The following official documents dealing with a nuclear test ban were presented to the Conference:

- CD/1179, dated 22 January 1993, entitled "Mandate for an Ad Hoc Committee under agenda item 1".
- CD/1199, dated 26 May 1993, submitted by the delegation of Canada, enclosing a booklet entitled "Non-Seismic Technologies in support of a Nuclear Test Ban".
- CD/1200/Rev.1, dated 11 June 1993, submitted by the Group of 21, entitled "Group of 21: draft statement" (first submitted as a draft decision on 2 June 1993).
- CD/1201, dated 3 June 1993, submitted by the delegation of Canada, enclosing a booklet entitled "Constraining Proliferation: the Contribution of Verification Synergies"
- CD/1202, dated 3 June 1993, submitted by the delegation of Sweden, entitled "Text of a Draft Comprehensive Test-Ban Treaty".
- CD/1204, dated 17 June 1993, submitted by the delegation of Mexico, transmitting copy of a letter entitled "Letter on Nuclear Testing sent to the President of the United States on 14 June 1993 by the Members of the Pugwash Council attending the 43rd Pugwash Conference in Hasseludden, Sweden".
- CD/1205, dated 20 July 1993, submitted by the delegation of the United States of America, entitled "Text of President Clinton's radio address of 2 July 1993 regarding his decision on U.S. nuclear testing policy".
- CD/1208, dated 27 July 1993, submitted by the delegation of Venezuela, entitled "Text of a communiqué issued by the Government of Venezuela in connection with the extension of the existing moratorium on nuclear testing".
- CD/1209, dated 3 August 1993, submitted by the delegations of Australia, Mexico and Nigeria, entitled "Draft decision".
- CD/1210, dated 4 August 1993, submitted by the delegation of Indonesia, entitled "Message from Mr. Ali Alatas, Minister for Foreign Affairs of Indonesia and President of the Amendment Conference of States Parties to the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water on the occasion of the 30th anniversary of the signing of the Treaty".
- CD/1212, dated 10 August 1993, entitled "Decision on agenda item 1 'Nuclear Test Ban' adopted by the Conference on Disarmament at its 659th plenary meeting on 10 August 1993".

In addition, the following working papers were presented to the Ad Hoc Committee:

- CD/NTB/WP.15, dated 26 February 1993, submitted by the delegation of Australia, entitled "A Nuclear Test Ban Treaty: Some reflections on verification".
- CD/NTB/WP.16 (also issued as CD/1199).

- CD/NTB/WP.17, dated 28 May 1993, submitted by the delegation of France, entitled "General introduction to non-seismic detection techniques".
- CD/NTB/WP.18 (also issued as CD/1201).
- CD/NTB/WP.19 (also issued as CD/1202).
- CD/NTB/WP.20, dated 11 June 1993, submitted by the delegation of Japan, entitled "NTB verification system by satellite"
- CD/NTB/WP.21, dated 11 June 1993, submitted by the delegation of the Russian Federation, entitled "Non-seismic methods of detecting nuclear explosions in the interests of monitoring a comprehensive nuclear test ban".
- CD/NTB/WP.22 and Corr.1, dated 25 June 1993, submitted by the delegation of New Zealand, entitled "Verification of a comprehensive nuclear test ban by means of non-seismic techniques: hydroacoustic methods"
- CD/NTB/WP.23, dated 25 June 1993, submitted by the delegation of France, entitled "Non-seismic detection techniques: survey of the state of the art and problems of synergy".
- CD/NTB/WP.24 (also issued as CD/1205).
- CD/NTB/WP.25, dated 5 August 1993, submitted by the delegation of Norway, entitled "Non-seismic detection of nuclear detonations".
- CD/NTB/WP.26, dated 24 August 1993, submitted by the delegation of Australia, entitled "Hydroacoustics and CTBT verification".
- CD/NTB/WP.27, dated 24 August 1993, submitted by the delegation of Australia, entitled "A CTBT and satellite and overhead verification technology".
- CD/NTB/WP.28, dated 24 August 1993, submitted by the delegation of Australia, entitled "On-site verification measures, transparency and information-sharing".
- CD/NTB/WP.29, dated 24 August 1993, submitted by the delegation of Australia, entitled "Review of the discussion of non-seismic verification methods".
- CD/NTB/WP.30, dated 24 August 1993, submitted by the delegation of Australia, entitled "Some reflections on existing proposals".
- CD/NTB/WP.31, dated 24 August 1993, submitted by the delegation of the United Kingdom of Great Britain and Northern Ireland, entitled "On-site inspection for nuclear test ban verification".
- CD/NTB/WP.32, dated 24 August 1993, submitted by the delegation of The Netherlands, entitled "Measuring radio-activity in the atmosphere and hydroacoustics: non-seismological monitoring techniques as part of the comprehensive verification system for a nuclear test ban treaty".

The following conference room papers were before the Ad Hoc Committee:

- CD/NTB/GRP.16, dated 18 February 1993, entitled "Indicative Schedule of Meetings - First part (19 January - 26 March 1993)".
- CD/NTB/GRP.16/Add.1, dated 25 March 1993, entitled "Indicative Schedule of Meetings - Second part (10 May - 25 June 1993)".
- CD/NTB/GRP.16/Add.2, dated 24 June 1993, entitled "Indicative Schedule of Meetings - Third part (26 July - 3 September 1993)".
- CD/NTB/GRP.17/Rev.1, dated 23 August 1993, entitled "Draft Report of the Ad Hoc Committee on a Nuclear Test Ban".

Furthermore, upon the request of the Ad Hoc Committee, the Secretariat updated a list of documents relating to a Nuclear Test Ban, submitted to the Conference of the Eighteen Nation Committee on Disarmament, the Conference of the Committee on Disarmament, the Committee on Disarmament, and the Conference on Disarmament (CD/NTB/INF.1/Add.2 of 16 February 1993).

III. SUMMARY OF DEVELOPMENTS DURING THE 1993 SESSION

9. From the outset of the 1993 session, the members of the Ad Hoc Committee were keenly aware that its deliberations throughout the session would be taking place in the context of a rapidly evolving international situation, particularly in the area of nuclear disarmament, and that its programme of work would therefore need to be adaptable to any possible developments in the field of nuclear testing. Moreover, the Ad Hoc Committee began its work in an atmosphere of heightened anticipation for a new momentum at the multilateral level towards a comprehensive test ban treaty, especially in the light of the moratorium on nuclear testing declared by the Russian Federation in October 1991, by France in April 1992, and by the United States in October 1992, and in the light of the fact that the United Kingdom had not conducted a test since November 1991, nor had China since September 1992. Many delegations from different groups made appeals, both in the Ad Hoc Committee and in the plenary meetings of the Conference, for the nuclear-weapon States to continue their declared moratoria beyond July 1993, and for all nuclear-weapon States which had not done so to join the moratoria.

10. The question of a CTBT received a great deal of attention in plenary meetings of the Conference throughout the annual session. The many views expressed in these meetings are contained in the following official records of the Conference: (CD/PV.636, 638-646, 648-652, 654-662).

11. The delegations of the Group of 21, Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), considered that it is urgent to conclude a comprehensive test ban treaty. They stressed, furthermore, that the conclusion of such a treaty would have a decisive influence on the outcome of the 1995 NPT Conference.

12. Other delegations of States Parties to the NPT, while recognizing the importance of negotiations of a CTBT, thought it essential to avoid linkage with the outcome of the 1995 NPT Conference, since this could put at risk the future of the nuclear non-proliferation regime, the maintenance of which would remain an essential element of international security. They underlined, furthermore, that the aim of a CTBT which genuinely contributed to non-proliferation would not be furthered by the imposition of deadlines.

13. Against this background, the Ad Hoc Committee adopted on 18 February 1993 a schedule for its first part only (CD/NTB/CRP.16). It began its work with general debate followed by discussions on verification and compliance and structure and scope as requested by the Conference in its mandate cited above.

14. During the course of general debate, upon a special request of the Ad Hoc Committee's Chairman, the nuclear-weapon States outlined their policies in respect of nuclear testing and a comprehensive nuclear test ban. The updates received from the nuclear-weapon States were highly appreciated by the other members of the Ad Hoc Committee. (The policies of the nuclear-weapon States were also elucidated at the following plenary meetings of the Conference: China - 645th plenary on 4 March and 650th plenary on 25 May; France - 657th plenary on 29 July; the Russian Federation - 640th plenary on 2 February and 658th plenary on 5 August; the United Kingdom - 658th plenary on 5 August and the United States - 657th plenary on 29 July). Upon the invitation of the Chairman, the Chairman of the Ad Hoc Group of Scientific Experts briefed the Ad Hoc Committee on the work of the Group during its 35th session when the Committee addressed the questions of verification and compliance.

15. There was a widely held view that, while seismic monitoring should form the core of future CTBT verification, monitoring by seismic means alone might not give confidence in compliance with a test ban. The Ad Hoc Committee therefore found that there was a need to begin an exploratory exercise on verification technologies, other than seismic, that could be useful for the verification system for a future CTBT. The Ad Hoc Committee, upon different proposals put forward by Australia and Germany on the subject, decided to devote the entirety of the second part of the session to an exploration of such non-seismic technologies (CD/NTB/CRP.16/Add.1). In order to enhance the technical level of the discussions, it was requested that delegations in a position to do so be assisted by technical experts. Twenty expert presentations were delivered over the course of the second and third parts of the session in this unprecedented substantive consideration of non-seismic verification techniques, covering a wide range of technologies.

16. The third part of the session began after important announcements had been made by the United States, France and the Russian Federation, on the issue of moratoria and on their policies on a CTBT, which were widely welcomed. These announcements are reflected in plenary statements made on 29 July and 5 August (see CD/PV.657 and 658). The discussions in the Ad Hoc Committee during the third part of the session were dominated by the process in the Conference which led to the 10 August decision to give the Ad Hoc Committee a negotiating mandate and for the Chairman of the Committee to hold consultations on how to organize its future work.

17. In parallel to those discussions, the Ad Hoc Committee continued to pursue its agreed agenda for the third part of the session (CD/NTB/CRP.16/Add.2). It began a discussion to consider the possible interrelationship of seismic and non-seismic verification technologies. As it was considered that the results of these discussions might have far-reaching consequences, some delegations believed it was premature to have in-depth talks on them. A suggestion was made to consider, for each of the possible environments in which a nuclear explosion could take place, holding a two-to-three day meeting of experts and delegates with a view to considering the entire range of questions involved in verifying a particular environment.

18. Also under this item, the Ad Hoc Committee heard a statement by the Chairman of the Ad Hoc Group of Scientific Experts, which brought it up to date on the work of the Ad Hoc Group at its 36th session, focusing in particular on the costs of a future seismic network as they relate to system capability.

19. The Ad Hoc Committee also took up, in accordance with the mandate given to it at the start of the 1993 annual session, a consideration of existing proposals. Under this item, several delegations commented on aspects of the draft for a CTBT put forward by Sweden on 3 June 1993 (CD/1202-CD/NTB/WP.19). A summary of the discussion on this item is found below.

Structure and scope

20. With regard to the issue of the scope of a future agreement, all delegations stressed that it was essential that a future CTBT be universally applicable, to non-nuclear-weapon States as well as to nuclear-weapon States, and effectively and internationally verifiable. Only in this way could the agreement make an effective contribution to the prevention of proliferation of nuclear weapons in all its aspects.

21. In its 1991 report to the Conference, the Ad Hoc Committee dealt with the issue of whether to include in the prohibition nuclear tests for peaceful purposes (PNES). Sweden revised its proposed draft for a CTBT (see CD/1202), to include the obligation of a State Party to prohibit "any nuclear-weapon test explosion, or any other nuclear explosion at any place under its jurisdiction or control". Several delegations welcomed Sweden's inclusion of PNES within the scope of the prohibition of nuclear explosions.

22. With regard to the question of a threshold nuclear test ban, the United States' delegation, for its part, clarified that its President had rejected the option of a 1-kiloton threshold agreement and would be seeking a comprehensive, not a limited or threshold, test ban.

Verification and compliance

23. There was general recognition that in order to ensure compliance with a future CTBT, an effective, internationally applicable verification system would be required. The Committee did not consider the scope of or the requirements for a verification regime. A number of delegations noted that, depending on future decisions on the scope of the prohibition and on requirements of the verification regime, much work remained to be done in this area. At the same time, a number of delegations registered their view that adequate verification technologies were already available. A view was also expressed that remaining difficulties might be more political than technical in nature. The question was raised as to whether the verification regime should cover possible nuclear explosions and preparatory activity in all environments. Some of the issues that preoccupied delegations during the session were those relating to:

- the substantial role that a global seismic monitoring network would have, especially in the underground test environment;
- the possible use of additional non-seismic verification technologies (see below) for the detection of nuclear tests in various environments including in relation to the question of evasion; and their possible use for the detection of pre-testing preparations;

- the question of costs of a future verification system, including in relation to its capabilities;
- the question of an implementing agency, its powers and functions and costs;
- the intimate inter-relationship between verification techniques applicable and the scope of Convention obligations; and,
- the issue of a possible mix of national and international means of verification, including in terms of cost effectiveness.

In addition to the issues listed above, India stressed that the verification system to be developed must be non-discriminatory in character in the sense of providing equal rights and obligations to the States Parties to the proposed treaty including equal access. Some other delegations expressed a similar view.

24. The work of the Conference's Ad Hoc Group of Scientific Experts, which is currently developing plans to test its revised concepts for an international seismic monitoring network in 1995, was generally appreciated. Various views were expressed on whether it was necessary or desirable to review the relationship of the Ad Hoc Committee to the Ad Hoc Group, including to take account of future negotiation requirements flowing from decisions to be taken by the Conference.

25. The issue of whether an existing organization or a newly-created institution would be the implementing agency for the future agreement continued to evoke keen interest among delegations. Specifically on the table was the proposal contained in the Swedish draft CTBT (CD/1202) that the International Atomic Energy Agency (IAEA) be entrusted with verification of compliance with the treaty. Questions on the role that IAEA might play were raised during the discussions. Bearing in mind that it was still very early to identify a particular implementing agency for a future ban, the Ad Hoc Committee decided to recommend to the Conference that a representative of the IAEA be invited to provide relevant information to it.

Non-seismic verification technologies

26. During the second and third parts of the session, a variety of non-seismic technologies for verifying a future CTBT was examined for the first time in the framework of the Ad Hoc Committee. Presentations on specific technologies were made either by experts themselves, as part of their national delegations, or by members of delegations, based on consultations with national experts. The Ad Hoc Committee used this exercise to identify technologies which might be useful to a verification system, and to gather information from experts on the advantages and disadvantages of such non-seismic technologies. The Ad Hoc Committee did not draw conclusions on the technologies presented. Nevertheless, these discussions provided the Committee with a basis for ongoing work, including on the possible interrelationship of seismic and non-seismic verification technologies.

27. The Ad Hoc Committee heard an overview of the subject by the delegations of Sweden and France which sought to place the discussion of individual non-seismic verification technologies in a broader context.

28. Two possible uses of non-seismic verification techniques were suggested. Such techniques could be supplementary to a global seismic monitoring network, that is, collecting information in parallel with a seismic network, with several networks simultaneously transmitting information to competent international or national authorities. They could also be viewed as complementary information-gathering nets, once an event that needed clarification was detected by a seismic or other sort of network and a focused verification was needed. The following non-seismic verification technologies and measures were identified (see also the list of documents above containing references to some of the presentations made):

- Hydroacoustic monitoring system:
presented by Australia, Germany, the Netherlands, New Zealand and Norway;
- Surveillance of atmospheric radioactivity:
presented by Canada, Germany, Italy, the Netherlands, the Russian Federation and Sweden;
- Surveillance by satellite and aerial monitoring:
presented by Australia, Canada, Japan and the Russian Federation;
- Electromagnetic pulse measurement:
presented by Norway and the Russian Federation;
- Infrasound measurement of the atmosphere:
presented by the Russian Federation;
- On-site observations and inspections:
presented by Italy, the Russian Federation and the United Kingdom;
- Chemical detection techniques:
presented by Canada;
- Static and time variant three-dimensional resistivity measurements:
presented by Canada
- Transparency measures and nationally-derived information-sharing arrangements (CBMs), including exchange of information on large-scale conventional explosions, invitations to outside observers, and relevant geological information exchange:
presented by Australia.

29. In addition, Australia and France presented, in their national capacities, summaries of the discussions held. Australia put forward several procedural proposals for the way in which the Ad Hoc Committee could deepen its discussions on the technologies that might be included in an overall verification system for a CTBT. It suggested: (a) technical hearings in the Ad Hoc Committee; (b) appointments of Friends of the Chair to organize technology-specific programmes; and (c) adding new work strands to the seismic work being done by the Ad Hoc Group of Scientific Experts. France, in its résumé, concluded that further work needed to be accomplished on how to establish synergy among the many techniques discussed.

30. It was widely considered that this examination of non-seismic verification technologies was a useful first step towards a more focused examination of their applicability to an eventual complete verification regime for a CTBT. The interaction of these technologies with each other and with a seismic network would need further consideration. Important work needed to be done also on the costs and cost-effectiveness of various technologies, on the related question of the institutional arrangements for verification and on the issue of the use of nationally acquired information in an international verification system.

Consideration of existing proposals

31. Under this item, the Ad Hoc Committee heard preliminary comments and reactions from several delegations to the Swedish proposed draft CTBT (CD/1202). The Swedish delegation announced that it would be submitting annexed protocols to the draft, detailing the verification arrangements it envisaged. The submission of the draft CTBT was welcomed by several delegations as a stimulus to a further consideration of many issues raised in the draft. Comments on the draft focused mainly on the inclusion of PNES in the prohibition of nuclear tests (see above under "Structure and scope"); on the proposal to entrust the IAEA with verification of compliance with the Treaty (see above under "Verification and compliance"); on the suggested definition of a nuclear explosion; also on the need for clarification of what constituted the obligation not to "cause" or "assist" a nuclear test explosion.

Conclusions and recommendations

32. It was widely recognized that the adoption of a decision to give the Ad Hoc Committee a negotiating mandate was a major turning point for multilateral work towards a CTBT. The Ad Hoc Committee benefited from a constructive and positive atmosphere throughout the session on the issues under its mandate. The deliberations of the Ad Hoc Committee this session marked a qualitative step forward on the long road towards a CTBT. In particular, the unprecedented expert presentations and subsequent discussions on non-seismic verification technologies had contributed considerably to the work on verification issues.

33. The Ad Hoc Committee welcomed the fact that, in accordance with the request made by the Conference in its decision (CD/1212) of 10 August 1993, the Chairman would conduct consultations during the period between 3 September 1993 and 17 January 1994 on the specific mandate for, and the organization of, the negotiation of a CTBT.

34. The Ad Hoc Committee recommends that it be reestablished at the outset of the 1994 session, taking into consideration the results of the consultations of the Chairman during the intersessional period.

CONFERENCE ON DISARMAMENT

CD/1227

13 October 1993

ENGLISH

Original: SPANISH

LETTER DATED 11 OCTOBER 1993 FROM THE PERMANENT REPRESENTATIVE OF CHILE
ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT
TRANSMITTING A STATEMENT BY THE GOVERNMENT OF CHILE CONCERNING THE
NUCLEAR TEST CARRIED OUT BY CHINA

I have the honour to request you to circulate as an official document of
the Conference on Disarmament the following statement by the Government of
Chile:

"The Government of Chile has learned of the decision of the
Government of the People's Republic of China to detonate a high-yield
nuclear device at the Lop Nor testing site in the western province of
Xinjiang. Although smaller than the test carried out by China in
May 1992, this test involved a yield five times that which destroyed the
Japanese city of Hiroshima at the end of the Second World War.

"Chile deplores this decision, which interrupts the voluntary
moratorium that had been initiated and places pressure on other nuclear
Powers which might reconsider their positions, leading to a return to a
nuclear testing race which appeared to have been rendered obsolete by new
approaches to security.

"The Government of Chile hopes that the test carried out by the People's Republic of China will be the last of its kind and that there will be no return to a race to upgrade nuclear weapons and weapons of mass destruction. The only way to create the climate of trust necessary to speed up the disarmament negotiations to be held in Geneva, with the aim of securing a ban on nuclear testing once and for all, is to ensure that all the nuclear Powers fully shoulder the responsibility incumbent on them not to continue such tests, which are repudiated by the moral conscience of the international community."

(signed): ERNESTO TIRONI
Ambassador
Permanent Representative

CONFERENCE ON DISARMAMENT

CD/1231

1 December 1993

ENGLISH

Original: ENGLISH/SPANISH

LETTER DATED 29 NOVEMBER 1993 FROM THE PERMANENT REPRESENTATIVE OF MEXICO ADDRESSED TO THE PRESIDENT OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT OF A WORKING PAPER OF THE GROUP OF 21 ENTITLED "CONCLUSION OF A COMPREHENSIVE NUCLEAR-TEST-BAN TREATY"

In my capacity as Coordinator of the Group of 21 on the item "Nuclear test ban", I have pleasure in submitting herewith a Group of 21 working paper entitled "Conclusion of a comprehensive nuclear-test-ban treaty".

I would be grateful if this working paper could be distributed as an official document of the Conference on Disarmament.

(Signed): Miguel Marín Bosch
Ambassador
Permanent Representative

GROUP OF 21

Working paper: "Conclusion of a comprehensive
nuclear-test-ban treaty"

The Group of 21 notes with satisfaction that the Conference on Disarmament is finally in a position to respond positively to the repeated calls of the international community over the last 30 years to conclude a comprehensive test-ban treaty (CTBT) by deciding "to give its Ad Hoc Committee on a Nuclear Test Ban a mandate to negotiate a CTB".

The Group of 21 believes that the conclusion of a CTBT is an indispensable measure to put an end to the nuclear arms race and to achieve the complete elimination of those weapons. To this end, it calls upon the international community, including the nuclear-weapon States, to begin urgently the negotiation of a CTBT, with a view to achieving a final text during 1994, in order to submit it as soon as possible to the General Assembly of the United Nations.

The scope of a CTBT prohibition was defined in the Partial Test-Ban Treaty wherein the Parties declared their commitment to conclude a treaty "resulting in the permanent banning of all nuclear test explosions, including all such explosions underground".

The Group of 21 is convinced that conditions today are propitious for the conclusion of a CTBT, bearing in mind the aim of general and complete disarmament under strict international control.

The negotiation of a CTBT should be guided, inter alia, by the following principles and elements in order to ensure its speedy conclusion and effective implementation:

- (1) The treaty should define in general terms the prohibition of nuclear tests in all environments and forever. It should avoid a detailed definition of what is a nuclear test. The treaty, therefore, should eliminate any possibility of carrying out nuclear tests in any environment and it should be of unlimited duration.
- (2) The CTBT to be developed must be non-discriminatory in character in the sense of providing equal rights and obligations to the States parties to the proposed treaty.
- (3) An internationally supervised and effective verification should be sought. The decision on the verification system to be incorporated in the treaty should not complicate the entry into force of the prohibition. It is generally accepted that seismic verification will constitute the central element of the future system and that it should be its point of departure.
- (4) The verification regime should be capable of dissuading would-be violators. The treaty should also contemplate a series of sanctions.
- (5) The treaty should not contain any provision that could be interpreted as restricting the transfer of nuclear technology for peaceful purposes.

CONFERENCE ON DISARMAMENT

CD/1232
CD/NTB/WP.33
6 December 1993

Original: ENGLISH

LETTER DATED 6 DECEMBER 1993 FROM THE HEAD OF THE
DELEGATION OF SWEDEN ADDRESSED TO THE SECRETARY-GENERAL
OF THE CONFERENCE ON DISARMAMENT TRANSMITTING THE TEXT
OF A DRAFT COMPREHENSIVE NUCLEAR TEST BAN TREATY AND
ITS ANNEXED DRAFT PROTOCOL

I have the honour to send you, enclosed, a draft
Comprehensive Nuclear Test Ban Treaty and its annexed draft
Protocol. The draft Treaty is a revision of the draft Treaty
text which was submitted on 3 June 1993 (CD/1202).

I should be grateful if the draft could be issued as an
official document of the Conference and as a Working Paper of the
Ad Hoc Committee on a Nuclear Test Ban.

(Signed) LARS NORBERG
Ambassador
Head of Delegation

DRAFT COMPREHENSIVE NUCLEAR TEST-BAN TREATY

The States Parties to this Treaty, hereinafter referred to as the "States Parties",

Convinced that recent fundamental international political changes provide opportunities to take further effective measures against the proliferation of nuclear arms,

Welcoming the conclusion of the START I and START II agreements, envisaging drastic reductions in present strategic nuclear arsenals,

Underlining the importance of the prompt implementation of these and other international disarmament and arms regulation agreements,

Stressing the need for further reductions of tactical and strategical nuclear weapons and their delivery systems,

Declaring their intention to undertake further measures towards nuclear disarmament and against the proliferation of nuclear weapons,

Recalling the determination expressed by the Parties in the Preamble to the 1963 Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time, and to continue negotiations to this end,

Recalling that the Parties in the above-mentioned Treaty undertake to prohibit, to prevent and not to carry out any nuclear weapon test explosion, or any other nuclear explosion in the atmosphere, in outer space and under water,

Convinced that a ban on all nuclear weapon test explosions, and any other nuclear explosions, is an important instrument in preventing the further proliferation of nuclear weapons,

Have agreed as follows:

Article I

Basic Obligations

1. Each State Party undertakes to prohibit, to prevent, and not to carry out, in any environment, any nuclear weapon test explosion, or any other nuclear explosion at any place under its jurisdiction or control.

2. Each State Party undertakes, furthermore, to refrain from causing, encouraging, assisting, preparing, permitting or in any way participating in the carrying out anywhere of any nuclear explosion referred to in paragraph 1 of this Article.

Article II

Implementation

1. The States Parties, in order to achieve the objectives of the Treaty and to ensure the implementation of the provisions of the Treaty, entrust the International Atomic Energy Agency, hereinafter referred to as the "Agency", with verification of compliance with the Treaty, as defined in Article III B.

2. The States Parties undertake to cooperate in good faith with the Agency in the exercise of its functions in accordance with this Treaty.

3. In order to fulfil its obligations under the Treaty, each State Party shall designate or set up a National Authority and shall so inform the Agency upon entry into force of the Treaty for such a State Party. The National Authority shall serve as the national focal point for liaison with the Agency and with other States Parties.

4. Each State Party undertakes to take any measures it considers necessary to prohibit and prevent any activity in violation of the provisions of the Treaty anywhere under its jurisdiction or control.

5. Each State Party shall inform the Depositary of the legislative and administrative measures taken to implement the Treaty.

Article III

Obligations of States Parties and the Agency

A. States Parties.

1. Each State Party undertakes to establish in cooperation with the Agency an effective international and universal monitoring regime. The regime includes the establishment of international monitoring systems based on seismological data, hydroacoustic data and data on radionuclides in the atmosphere and the use of additional relevant techniques.

The arrangements for these international monitoring measures are laid down in the Protocol, annexed to this Treaty.

Each State Party undertakes to establish the necessary facilities to participate in these cooperative measures and through its National Authority to establish the necessary communication channels with the Agency. These arrangements shall be operative on the entry into force of this Treaty.

2. Large non-nuclear explosions carried out by a State Party shall be conducted in accordance with provisions laid down in the Protocol, annexed to this Treaty.

B. The Agency

In the exercise of its functions in accordance with this Treaty,
the Agency shall

- coordinate the international monitoring régime including the exchange of seismological data, data on radionuclides in the atmosphere and other data relevant to the monitoring of compliance with the Treaty;
- endeavour, at the request of a State Party, through cooperation with the National Authorities of the States Parties and through other means, to clarify inconsistencies that may occur with regard to events relevant to compliance with the Treaty.
- verify, when inconsistencies are not clarified, compliance with the Treaty through on-site inspection in accordance with Article IV;

ARTICLE IV

Verification

1. Each State Party shall, in order to assist in the interpretation of an event that may be of relevance to the Treaty at any place under its jurisdiction or control, provide such additional information that the Agency might request.
2. Each State Party may use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law to verify compliance with the Treaty.
3. If the nature of an event can not be clarified through the measures specified in paragraphs 1 and 2 of this Article, each State Party is entitled to request an on-site inspection on the territory of any other State Party for the purpose of ascertaining compliance with this Treaty. The requesting State Party shall state the reasons for its request, including the evidence available. Such requests shall be addressed to the Director General of the Agency, who shall bring the matter to the attention of the Board of Governors of the Agency.
4. If the Board of Governors decides to conduct an on-site inspection, the relevant State Party is under obligation to comply with the Board's decision. Such inspections shall be conducted by the Agency, and the report shall be transmitted by the Director-General of the Agency to the Board of Governors and all States Parties. The Board of Governors shall decide on and report any findings of non-compliance essential to the achievement of the objectives of the Treaty or of the spirit of the Treaty, to the Security Council of the United Nations and all States Parties. Decisions on questions mentioned in this paragraph shall be made by the Board of Governors by two-thirds majority of those present and voting. Procedures for such inspections, including the rights and functions of the inspecting personnel, are laid down in the Protocol, annexed to this Treaty.
5. A State Party, on whose territory an event has occurred, may invite the Agency to conduct an on-site inspection.

ARTICLE V

Complaints

Any State Party which finds that any other State Party is acting in breach of obligations deriving from the provisions of the Treaty, may lodge a complaint with the Security Council of the United Nations. Such a complaint shall include all possible evidence confirming its validity.

Article VI

Privileges and Immunities

1. In order to enable them to carry out the functions entrusted to them under this Treaty, the States Parties to this Treaty shall grant privileges and immunities to the Director-General and personnel of the Agency in accordance with the Vienna Convention on Diplomatic Relations of 18 April 1961.

2. Provisions regarding privileges and immunities in connection with on-site inspections are contained in the Protocol, annexed to this Treaty.

Article VII

Status of Protocol

The Protocol to this Treaty constitutes an integral part of the Treaty.

Article VIII

Settlement of Disputes

If any dispute arises between two or more State Parties or between two or more States Parties and the Agency concerning the interpretation or application of the present Treaty, the Parties concerned shall consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, or other peaceful means of their own choice. Any dispute may, with the consent of all parties to the dispute, be referred to the International Court of Justice for settlement.

Article IX

Amendments

At any time after the entry into force of this Treaty, any State Party may propose amendments to the Treaty or to the annexed Protocol. Any proposal for an amendment shall be communicated to the Depositary, who shall circulate it to all States Parties and seek their views on whether a conference should be convened to consider the proposal. If a majority, that shall not be less than thirty of the States Parties, including the nuclear-weapon States, so agree, the Depositary shall promptly convene a conference to which all States Parties shall be invited. The Conference may adopt amendments proposed, if a majority of the States Parties present and voting, including the nuclear-weapon States, so agree. Amendments shall enter into force for each Party accepting them upon their adoption by the Conference and thereafter for each remaining Party on the date of acceptance of the amendments by such a Party.

Article X

Review of the Treaty

Five years after the entry into force of this Treaty, or earlier if it is requested by a majority of the States Parties to the Treaty by submitting a proposal to this effect to the Depositary, a conference of States Parties to the Treaty shall be held at, to review the operation of the Treaty, with a view to assuring that the purposes of the preamble and the provisions of the Treaty are being realized. Such review shall take into account any new scientific and technological developments relevant to the Treaty. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article XI

Entry into force

1. This Treaty shall be open to all States for signature. Any State which does not sign this Treaty before its entry into force in accordance with this Article may accede to it at any time.
2. This Treaty shall be subject to ratification by Signatory States.
3. This Treaty shall enter into force upon the deposit of instruments of ratification by forty States, including the nuclear-weapon States. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967.
4. For those States whose instruments of ratification or accession are deposited after the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

Article XII

Reservations

The Articles of this Treaty, including the Articles of the annexed Protocol which constitutes an integral part of the Treaty, shall not be subject to reservations.

Article XIII

Depositary

1. The Secretary-General of the United Nations shall be the Depositary of this Treaty and shall receive the instruments of ratification and instruments of accession.
2. The Depositary shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession and the date of the entry into force of this Treaty and of any amendments thereto, any notice of withdrawal, and the receipt of other notices. He shall also inform the Security Council of the United Nations of any notice of withdrawal.
3. This Treaty shall be registered by the Depositary in accordance with Article 102 of the Charter of the United Nations.

Article XIV

Duration and Withdrawal

1. This Treaty is of a permanent nature and shall remain in force indefinitely, provided that in the event of a violation by any party of a provision of this Treaty essential to the achievement of the objectives of the Treaty or of the spirit of the Treaty, every other Party shall have the right to withdraw from the Treaty.

2. Withdrawal shall be effected by giving notice twelve months in advance to the Depositary who shall circulate such notice to all other Parties.

Article XV

Official Languages

This Treaty, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send duly certified copies thereof to the Governments of the signatory and acceding States.

In witness whereof, the undersigned, duly authorized thereto, have signed this Treaty.

P R O T O C O L
TO THE
DRAFT COMPREHENSIVE NUCLEAR TEST-BAN TREATY

SECTION I - GENERAL PROVISIONS

Article 1. The International Atomic Energy Agency, hereinafter called the Agency, shall be entrusted with verification functions specified in Articles III B. and IV of the Treaty.

Article 2. Each State Party undertakes, in accordance with Article III A. 1. of the Treaty, to cooperate in good faith with each other and the Agency to facilitate the verification of compliance with this Treaty.

Article 3. The costs for the Agency's verification functions, mentioned in Article 1, shall be borne by the States Parties in accordance with the United Nations scale of assessment.

SECTION II - THE AGENCY

Article 4. In performing its verification functions, mentioned in Article 1, the Agency shall,

- establish and operate an International Data Centre to be the central facility of the international monitoring system based on seismological data, data on radionuclides in the atmosphere, hydroacoustic data, satellite data and other data relevant to the verification of the Treaty. Easy and free access to all services of the Centre shall be granted to all Parties to the Treaty;
- establish and operate networks of seismological and hydro-acoustic stations and stations to monitor radionuclides in the atmosphere;
- conduct on-site inspections and observations relevant to the verification of the Treaty;
- cooperate with National Authorities of the States Parties to resolve uncertainties regarding compliance with the Treaty;
- assist States Parties on other issues of verification of the Treaty.

Article 5. The Agency shall establish, and the Board of Governors of the Agency shall approve, the following Operational Manuals to guide the operation of the various components of the verification system:

- Operational Manual for International Exchange of Seismological Data;
- Operational Manual for International Exchange of Data on Radionuclides in the Atmosphere;

- Operational Manual for International Exchange of Hydroacoustic Data;
- Operational Manual for Satellite Data Processing;
- Operational Manual for International On-site Inspections;
- Operational Manual for On-Site Observations of Non-Nuclear Explosions.

These Manuals are not integral parts of the Treaty and can be changed by the Board of Governors of the Agency. The Agency shall inform the States Parties of any changes in the Operational Manuals.

Article 6. The Agency shall coordinate the operation of the international monitoring network and in particular

- operate the International Data Centre to compile, process and report on seismic data, hydroacoustic data and data on radionuclides in the atmosphere;
- operate a specified network of seismological stations, hydroacoustic stations and stations to measure radionuclides in the atmosphere;
- ensure that the operation of participating seismological stations, hydroacoustic stations and stations to measure radionuclides in the atmosphere and their reporting are in compliance with the respective Operational Manuals;
- provide technical support for the installation and operation of seismological stations, hydroacoustic stations and stations to measure radionuclides in the atmosphere;
- compile and evaluate results and experiences of the operation of the monitoring network.

Article 7. The Agency shall assist States Parties in utilizing satellite data in order to clarify seismic and other events in relation to this Treaty. The Agency shall operate the International Data Centre to compile, process and report on satellite observations, provided by States Parties or obtained from other sources.

Article 8. The Agency shall receive, compile and report to all States Parties any additional information that a State Party may provide to assist in the interpretation of an event which has occurred on its territory.

The Agency shall forward requests for information made by any State Party to any other State Party on any event relevant to this Treaty occurring on the territory of the latter State. The Agency shall receive, compile and report on any information received in response to such requests.

Article 9. The Agency shall facilitate consultations among States Parties to resolve issues related to the verification of the Treaty.

Article 10. The Agency shall, as specified in the Operational Manual for On-Site Observations of Non-Nuclear Explosions, mentioned in Article 5, conduct on-site monitoring of non-nuclear explosions in excess of 500 tons TNT equivalent, and report the result of such observations to the States Parties. The Agency shall also compile and distribute a monthly list of reported non-nuclear explosions in excess of 100 tons TNT equivalent. The Agency shall also conduct routine inspections at sites which States Parties have declared to be routinely used for the conduct of non-nuclear explosions in excess of 100 tons TNT equivalent.

Article 11. An Advisory Board of international experts shall be established by the Board of Governors of the Agency to provide scientific expertise on verification measures and to assist the Board of Governors in evaluating the methodology and the scientific quality of the procedure used and in assessing the value of new methods to be considered for the verification of this Treaty and which the Board of Governors may wish to report to the Review Conference, mentioned in Article IX of the Treaty.

SECTION III - THE GLOBAL MONITORING SYSTEM

Article 12. Each State Party undertakes to participate in the establishment and the operation of an international monitoring system. This obligation includes the establishment and operation of a two-tiered network of high quality seismological stations. The first tier, referred to as a network of Alpha stations, is established and operated by the Agency and provides uninterrupted data transmitted on-line to the International Data Center. The second tier, referred to as a network of Beta stations, is established and operated by the States Parties and provides data in near real time upon request by the International Data Center.

The States Parties are also obliged to participate in the establishment and operation of a network of high quality stations to measure radionuclides in the atmosphere. The stations are established and operated by the Agency and provide data promptly to the International Data Centre.

The States Parties are also committed to the establishment and operation of a network of high quality hydroacoustic stations in the oceans. These stations are established and operated by the Agency and provide uninterrupted data transmitted on-line to the International Data Center.

Article 13. Each State Party shall have the right to receive all data and information available from the International Monitoring Systems and shall make the necessary arrangement with the Agency through its National Authority.

Article 14. The Agency shall, in cooperation with the States Parties, establish and operate a specified network of high quality seismological stations. This network consists initially of the stations specified in Table 1, annexed to this Protocol. These stations shall fulfill the technical and operational requirements summarized in table 2 and further specified in the Operational Manual for International Exchange of Seismological Data. Uninterrupted data from the Alpha stations shall be transmitted on-line to the International Data Center.

Article 15. The Agency shall control the quality of the network of Alpha stations and evaluate its overall performance. The Board of Governors of the Agency may amend the network by technically upgrading stations and by adding or deleting stations in the annexed Table 1, which is not an integral part of the Treaty.

Article 16. The Agency shall make the necessary legal and other arrangements with the States Parties to establish and operate one or several Alpha stations on its territory. For an existing facility, a State Party shall give the Agency authority to use the station as an Alpha station as specified in the Operational Manual for International Exchange of Seismological Data and to make necessary changes in the equipment and the operational procedures to meet these requirements. A State Party shall cooperate with the Agency to establish a new station at a site to be agreed upon. The State Party shall provide the required land for the station free of charge and cooperate with the Agency in establishing the station and the infrastructure needed to support it. A State Party shall also transfer authority to operate the station or stations to the Agency and cooperate with the Agency in the routine operation.

Article 17. To supplement the Alpha network, a number of additional high quality stations referred to as Beta stations shall be established. The Beta stations to be used initially are listed in Table 3, annexed to this Protocol. The Beta stations shall be established and operated by the State Party on which territory it is situated. The Agency shall, if requested, provide technical assistance to a State Party in this regard. The Beta stations shall meet the technical and operational requirements specified in the Operational Manual for International Exchange of Seismological Data. Data from the Beta stations is to be requested by the International Data Center and shall be immediately available through on-line computer connections.

Article 18. The Agency shall control the quality of the network of Beta stations and evaluate its overall performance. The Board of Governors of the Agency may amend the network by adding or deleting stations in the annexed Table 3, which is not an integral part of the Treaty.

Article 19. The International Data Centre shall routinely receive all seismological data contributed to the international exchange by its participants, process and distribute these data to all participants within two days, store all data contributed by participants as well as the results of the processing at the Centre. The procedures to be used at the Centre are laid down in the Operational Manual for International Exchange of Seismological Data. The Centre shall further coordinate requests for additional seismological data from one State Party to another Party and make such data available to all States Parties.

Article 20. Each State Party is encouraged to assist in the assessment of the nature of the seismic events located by the International Data Centre by contributing any additional information available about events located in its own territory.

Article 21. The Agency shall, in cooperation with the States Parties, establish and operate a specified network of high quality stations to measure radionuclides in the atmosphere. This network consists initially of the stations specified in Table 4, annexed to this Protocol. These stations shall fulfill the technical and operational requirements summarized in Table 5 and further specified in the Operational Manual for International Exchange of Data on Radionuclides in the Atmosphere.

Article 22. The Agency shall control the quality of the network of stations to measure radionuclides in the atmosphere and evaluate its overall performance. The Board of Governors of the Agency may decide to amend the network by adding or deleting stations in the annexed Table 4, which is not an integral part of the Treaty.

Article 23. The Agency shall make the necessary legal and other arrangements with the States Parties to establish and operate one or several stations on its territory to measure radioactivity in the atmosphere. For an existing facility a State Party shall give the Agency authority to use the station as a station to measure radionuclides in the atmosphere as specified in the Operational Manual for International Exchange of Data on Radionuclides in the Atmosphere and to make necessary changes in the equipment and the operational procedures to meet these requirements. A State Party shall cooperate with the Agency to establish a new station at a site to be agreed upon. The State Party shall provide the required land for the station free of charge and cooperate with the Agency in establishing the station and the infrastructure needed to support it. A State Party shall also transfer authority to operate the station or stations to the Agency and cooperate with the Agency in the routine operation.

Article 24. In addition to routinely submitted measurements, each State Party may provide any other relevant measurement on radionuclides in the atmosphere. Each State Party may also request additional data from a third party through the Agency. The procedures for making such requests are laid down in the Operational Manual for International Exchange of Data on Radionuclides in the Atmosphere.

Article 25. The International Data Centre shall receive all measurements on radionuclides in the atmosphere contributed to the international exchange by its participants and routinely process these measurements according to established procedures. The Centre shall, at the request by a State Party, evaluate an observed release of radionuclides in the atmosphere as well as the time and location of the source. In this analysis, relevant wind trajectories obtained from meteorological data shall be used. The results of the analysis shall be distributed to all participants within one week, and the records thereof be kept at the Centre. The procedures to be used in the analysis at the Centre are laid down in the Operational Manual for International Exchange of Data on Radionuclides in the Atmosphere. The Centre shall also coordinate requests for additional measurements from one State Party to another and circulate the information obtained as a result of such requests.

Article 26. The Agency shall, in cooperation with the States Parties, establish and operate a specified network of high quality hydroacoustic stations. This network consists initially of the stations specified in Table 6, annexed to this Protocol. These stations shall fulfill the technical and operational requirements summarized in Table 7 and further specified in the Operational Manual for International Exchange of Hydroacoustic Data. Uninterrupted data from the stations shall be transmitted on-line

Article 27. The Agency shall control the quality of the hydroacoustic stations and evaluate their overall performance. The Board of Governors of the Agency may decide to amend the network by adding or deleting stations in the annexed Table 6, which is not an integral part of the Treaty.

Article 28. A State Party shall, at the Agency's request, cooperate with the Agency in establishing and operating one or several hydroacoustic stations on its territory. For an existing facility, a State Party shall give the Agency authority to use the station as an hydroacoustic station as specified in the Operational Manual for International Exchange of Hydroacoustic Data and to make necessary changes in the equipment and the operational procedures to meet these requirements. A State Party shall cooperate with the Agency to establish a new station at a site to be agreed upon. The State Party shall provide the required land for the station free of charge and cooperate with the Agency in establishing the station and the infrastructure needed to support it. A State Party shall also transfer authority to operate the station or stations to the Agency and cooperate with the Agency in the routine operation.

Article 29. The International Data Centre shall routinely receive data from hydroacoustic stations, process and distribute these data to all participants within two days, store all data contributed by participants as well as the results of the processing at the Centre. The procedures to be used at the Centre are laid down in the Operational Manual for International Exchange of Hydroacoustic Data.

Article 30. Each State Party undertakes to make satellite image data available on terms to be agreed by the Agency. The Agency shall, upon request, assist States Parties in the processing of satellite image data to facilitate the interpretation of events relevant to this Treaty. The procedures to be used by the Agency are laid down in the Operational Manual for Satellite Data Processing.

Article 31. The Agency shall facilitate cooperation among States Parties in using additional means of verification which any State Party may find useful. The Agency shall receive, compile and circulate any data relevant to the verification of this Treaty which any State Party makes available.

Article 32. The Agency shall, in consultation with the States Parties, provide technical support to establish, operate and maintain such additional means of verification.

Article 33. Additional means of verification of compliance with this Treaty may include acoustic and ionospheric measurements in the atmosphere.

SECTION IV: PROCEDURES FOR ON-SITE INSPECTIONS AND MONITORING

PART 1: Procedures for On-Site Inspections

Article 34. The basic rules for verification through on-site inspection are laid down in Article IV of this Treaty.

Article 35. The purpose of an international on-site inspection is to verify compliance with the Treaty. A team of inspectors (hereinafter referred to as the Inspection Team) shall be dispatched by the Agency and shall present a report to the Board of Governors of the Agency on the observations made during the inspection.

Article 36. The Inspection Team shall begin its inspection in the specified area to be inspected not later than seven days after the Board of Governors of the Agency has decided to conduct an inspection. This area must be continuous and not exceed 1.000 km² or a distance of 50 km in any direction. An inspection shall normally not exceed seven days after the arrival of the Inspection Team at the site in the territory of the State Party to be inspected.

Article 37. In accordance with the Agency's basic rights to use its own communication systems and means of transport and to take samples and bringing such samples out of the inspected country, the Inspection Team shall, during an international on-site inspection, be entitled to

- conduct visual inspections of the area from the air and on the ground;
- conduct inspections of the area using infrared means of observation from the air and on the ground;

- take photographs in the visual and infrared parts of the spectrum from the air and on the ground;
- measure radiation and levels of radioactivity in the atmosphere above the area, at ground level and in water;
- conduct temporary seismological measurements in the area.

Article 38. The Director-General of the Agency shall notify the inspected State Party not less than 12 hours prior to the planned arrival of the Inspection Team at the point of entry as defined in the Manual.

Article 39. An international on-site inspection shall be carried out by the personnel and experts of the Agency. The rules and detailed procedures for such on-site inspections are laid down in the Manual for International On-Site Inspections.

At all times while the inspecting personnel are in the territory of the State Party to be inspected, their persons, property, personal baggage, archives and documents as well as their temporary official and living quarters shall be accorded the same privileges and immunities as provided in the Vienna Convention on Diplomatic Relations to the persons, property, personal baggage, archives and documents of diplomatic agents as well as to the premises of diplomatic missions and private residences of diplomatic agents.

Without prejudice to their privileges and immunities, it shall be the duty of the inspecting personnel to respect the laws and regulations of the State in the territory of which the inspection is to be carried out, as long as such laws and regulations are not in conflict with the proper exercising of the rights and functions provided for by the Treaty and this Protocol.

PART 2: Procedures for On-Site Monitoring of Non-Nuclear Explosions

Article 40. For an explosion with a yield exceeding 500 tons TNT equivalent or any group of explosions with an aggregate yield exceeding the same limit, the State Party conducting such an explosion shall notify the Agency not later than 15 days prior to the event. This notification shall include

- the time, location, purpose and yield of the explosion;
- a full description of the event, including a timetable for loading the charge;
- any other relevant information that a State Party wishes to submit.

Article 41. A State Party conducting an explosion with a yield exceeding 100 tons but not exceeding 500 tons TNT equivalent shall provide the Agency with information on such an event not later than seven days after the explosion.

Article 42. Personnel from the Agency shall monitor on-site the preparations for, and the detonation of, any non-nuclear explosion with a yield exceeding 500 tons of TNT equivalent.

Based on the information provided by the State Party conducting the explosion, the Director-General of the Agency shall decide from what date observers shall follow the preparation work. The on-site observation shall include the conduct of the explosion and observation of its result. The detailed rules and procedures are laid down in the Operational Manual for On-Site Monitoring of Non-Nuclear Explosions.

Article 43. A State Party, which regularly conducts explosions with yields exceeding 100 tons TNT equivalent within a limited area, e.g. a mine, might establish a declared site for non-nuclear explosions. In the declaration the State Party shall submit to the Agency a description of the planned explosive activities, the purpose of the explosions and of the site itself. A declared site shall be open to on-site observation by the Agency at any time and the Agency might place on-site recording equipment at the site as defined in the Operation Manual for On-Site Monitoring. For explosions at declared sites a State Party is not obliged to provide information prior to or after an explosion as specified in articles 40 and 41.

Article 44. The personnel conducting the on-site monitoring shall be allowed to follow the preparation of the explosion, including the loading of the charge or charges. They should further be allowed to take pictures and to make measurements of radiation and levels of radioactivity in the air and in water in the vicinity of the event, prior to and after the explosion.

Article 45. The Agency shall establish a factual report of each non-nuclear explosion monitored and submit the report to all States Parties and to the Board of Governors of the Agency.

Article 46. On-site monitoring of a non-nuclear explosion shall be carried out by personnel and experts of the Agency. The rules and detailed procedures for such on-site monitoring are laid down in the Manual for On-Site Observations of Non-Nuclear Explosions.

At all times while the monitoring personnel are present in the territory of the State Party to be inspected or in a territory under the jurisdiction or control of that State party, their persons, property, personal baggage, archives and documents as well as their temporary official and living quarters shall be accorded the same privileges and immunities as provided in the Vienna

Convention on Diplomatic Relations to the persons, property, personal baggage, archives and documents of diplomatic agents as well as to the premises of diplomatic missions and private residences of diplomatic agents.

Without prejudice to their privileges and immunities, it shall be the duty of the monitoring personnel to respect the laws and regulations of the State in whose territory the inspection is to be carried out, as long as such laws and regulations are not in conflict with the proper exercising of the rights and functions provided for by the Treaty and this Protocol.

Table 1
 INITIAL LIST OF ALPHA STATIONS

	Station	Code	Location	Configuration
1	NORSAR, NORESS, Norway	NORO, NR	61.040, 11.215	array
2	ARCESS, Norway	ARAO	69.535, 25.506	array
3	Spitsbergen	SPAO	78.178, 16.370	array
4	FINESS, Finland	FLAO	61.444, 26.079	array
5	GERESS, Germany	GEC2	48.816, 13.704	array
6	Peleduy, Russia	PDYO	58.0, 114.0	array
7	Norilsk, Russia	XNS(NRI07)	69.400, 88.100	array
8	Zalesovo, Russia	ZAL	53.940, 84.805	3-C
9	Khabar, Russia	KBZO	43.729, 42.898	array
10	Eastern Siberia, Russia	XES, SEY	62.9, 152.4	3-C
11	Akzhinsk, Kazakhstan	AKYO	50.434, 58.018	regional array
12	Alibek, Turkmenistan	GEYO	37.930, 58.118	regional array
13	Ilumuchl, China	WMO	43.821, 87.695	3-C
14	Eastern China	ENHO	30.272, 109.487	regional array
15	Hallar, China	HIA	49.267, 119.742	3-C
16	Pakistan	PAKO	33.650, 73.252	regional array
17	Matsushiro, Japan	MAT	36.542, 138.207	regional array
18	Indonesia	XIN	-2.5, 103.4	3-C
19	New Guinea	XNG	-5.0, 140	3-C
20	Alice Springs, Australia	ASAR	-23.666, 133.905	Teleseismic array
21	Warramunga, Australia	WRA	-19.944, 134.341	Teleseismic array
22	Stephens Creek, Australia	STK	-31.882, 141.592	3-C
23	Cool, Australia	COOL	30.883, 121.145	3-C
24	Mawson, Antarctica	MAW	-67.604, 62.871	3-C
25	Korean Research Array	XKOO	37.128	Teleseismic array
26	Thailand	XTHO	19.99	Teleseismic array
27	Sonseca, Spain	ESLA	39.675, -3.965	Teleseismic array
28	Turkey	XTUO	39.34	Teleseismic array
29	Ivory Coast	DBIC	6.670, -4.256	3-C
30	Banqui, Central African Rep.	BGCA	5.176, 18.424	3-C
31	Lombasi, Botswana	LBTB	-25.015, 25.597	3-C
32	Boshof, South Africa	BOSA	28.613, 25.416	Regional array
33	Luxor, Egypt	LUXO	26.0, 33.0	Regional array
34	Nairobi, Kenya	NAI	-1.274, 36.804	3-C

35	Northern Africa	XAF, TAM	72.8,	5.5	3-C
36	Paso Flores, Argentina	PLCA	-40.731,	-70.550	3-C
37	Villa Florida, Paraguay	CPUP	-26.331,	-57.329	3-C
38	La Paz, Bolivia	LPAZ	-16.288,	-68.131	3-C
39	Brasilia, Brazil	BDFB	-16.644,	-48.014	Regional array
40	Northern South America	XSA, RQG?, PSO?	4.6,	-74.0	3-C
41	Gauribidanur, India	GDA	13.604,	77.436	Teleseismic array
42	South Pole, Antarctica	SPA	-90.0,	0.0	3-C
43	Vanda, Antarctica	VNDA	-77.519,	161.846	3-C
44	Lajitas, Texas	LTXU	29.334,	-103.667	Regional array
45	Pinedale, Wyoming	PINO	42.780,	-109.560	Teleseismic array
46	Goldstone, Calif	GSC	35.302,	-116.805	3-C
47	Newcomb, New York	NCB	44.0,	-74.0	3-C
48	Powhatan, Arkansas	POW	36.152,	-91.185	3-C
49	North pole, Alaska	NPO	64.771,	-146.886	3-C
50	Yellowknife, NW Territories	YKA	62.493,	-114.605	Teleseismic array
51	Central Canada	XCC	55,	-102	3-C
52	Eastern Canada	XEC	50.5,	69.0	3-C
53	Blue Ice, Greenland	ILG	79.178,	-39.370	3-C

Table 2
 STATION REQUIREMENTS FOR Alpha STATION

Category	Requirement
Pass Band	02-20 Hz (Alpha and Beta)*
Seismometer Noise	10 dB below Peterson low earth noise model
Calibration	within 5% in amplitude and 5° in phase
Sample Rate	40 samples per second (±50 µs)
Resolution	18 dB below Petersons low noise model
Sensitivity	200.../nm @ 3 Hz
System Noise	10 dB below Petersons low earth noise curve
Dynamic Range	126 dB
Linearity	90 dB over the pass band
Timing Accuracy	1 ms (Network standard timing required)
Operating Temperature	-10° C to 45° C
Authentication	required
State of Health	a minimum of clock status, calibration status and vault status
Format	must be one of the official GSE formats
Protocol	TCP/IP (Beta)
Delay in Transmission	< 15 seconds
Data Frame Length	< 1 second
Data access	Priority given to IDC, then NDC
Disk Buffer	7 days
Data Availability	greater than 99%
Timely Data Transmission	greater than 98%
Station Location	known within 100 meters relative location of array elements
known	to within 1 meter
Seismometer Orientation	known within 1 degree

* 8.0 hertz for stations with "unique" capabilities

Table 3
Initial list of Beta Stations (to be established)


Table 4
initial list of Station to measure radioactivity in the atmosphere (to be established)

Table 5
Requirments for stations to measure radioactivity in the atmosphere (to be established)

Table 6
List of Hydroacoustic stations. (to be established)

Table 7
Requirements for Hydmacoustic stadions (to be established)

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