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II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DECISION

of 23 March 1998

concerning the conclusion of the Convention on the Transboundary Effects of Industrial Accidents

(98/685/EC)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130s(1) thereof, in conjunction with the first sentence of Article 228(2) and the first subparagraph of Article 228(3) thereof,

Having regard to the proposal of the Commission ⁽¹⁾,

Having regard to the opinion of the European Parliament ⁽²⁾,

Whereas the Commission took part, on behalf of the Community, in the negotiations with a view to the conclusion of the Convention on the Transboundary Effects of Industrial Accidents; whereas the Convention was signed on behalf of the Community in Helsinki on 18 March 1992;

Whereas the Convention aims at protecting human beings and the environment against industrial accidents capable of causing transboundary effects and at promoting active international cooperation between the Contracting Parties before, during and after such accidents;

Whereas the conclusion of the Convention comes within the scope of the Community's participation in

international measures to protect the environment, recommended by the fifth Action Programme on the Environment, the general approach of which was approved by the Council and the Representatives of the Governments of the Member States, meeting within Council, in their Resolution of 1 February 1993 ⁽³⁾;

Whereas, in accordance with the principles stated in Article 130r of the Treaty, the control of major-accident hazards involving dangerous substances constitutes a matter of utmost importance for all Member States in view of the cross-border nature of the effects on the environment and human health of major industrial accidents involving such substances;

Whereas Council Directive 82/501/EEC of 24 June 1982 on the major-accident hazards of certain industrial activities ⁽⁴⁾ and Council Directive 96/82/EC of 9 December 1996 on the Control of major-accident hazards involving dangerous substances ⁽⁵⁾ aim at the prevention of major accidents and the limitation of their consequences for man and the environment; whereas these Directives contain provisions concerning transboundary cooperation;

Whereas it is therefore necessary for the Community to approve the Convention;

⁽³⁾ OJ C 138, 17.5.1993, p. 1.

⁽⁴⁾ OJ L 230, 5.8.1982, p. 1. Directive as last amended by the 1994 Act of Accession.

⁽⁵⁾ OJ L 10, 14.1.1997, p. 13.

⁽¹⁾ OJ C 267, 3.9.1997, p. 60.

⁽²⁾ OJ C 339, 10.11.1997, p. 26.

Whereas for certain substances, namely bromine, methanol, oxygen and substances dangerous for the environment, the threshold quantities set out in Directive 96/82/EC differ from those mentioned in Part I of Annex I to the Convention;

Whereas it will not be possible for the Community to apply the aforementioned threshold quantities for the abovementioned substances; whereas, therefore, in order to enable the Convention to be approved, reservations have to be formulated;

Whereas, in order for the Convention to enter into force without delay, it is necessary that signatory Member States carry out their procedures for ratification, acceptance or approval of the Convention as soon as possible, in order to enable the Community and the Member States to deposit their instruments of ratification, acceptance or approval,

HAS DECIDED AS FOLLOWS:

Article 1

The Convention on the Transboundary Effects of Industrial Accidents is hereby approved on behalf of the Community subject to the reservations appearing in Annex I hereto.

The text of the Convention is attached to this Decision.

Article 2

The President of the Council is hereby authorised to designate the persons empowered to deposit, on behalf of the Community, the instrument of approval with the Secretary-General of the United Nations Organisation, in accordance with Article 28 of the Convention. When depositing the instrument of approval and the reservations in Annex I, the said person(s) will deposit the declaration of competence appearing in Annex II hereto.

Article 3

This Decision shall be published in the *Official Journal of the European Communities*.

Done at Brussels, 23 March 1998.

For the Council

The President

M. MEACHER

*ANNEX I***RESERVATIONS**

The Member States of the European Community, in their mutual relations, will apply the Convention in accordance with the Community's internal rules.

The Community therefore reserves the right:

- (i) as concerns the threshold quantities mentioned in Annex I, Part I, Nos 3, 4 and 5 of the Convention, to apply threshold quantities of 100 tonnes for bromine (very toxic substance), 5 000 tonnes for methanol (toxic substance) and 2 000 tonnes for oxygen (oxidising substance);
- (ii) as concerns the threshold quantities mentioned in Annex I, Part I, No 8 of the Convention, to apply threshold quantities of 500 tonnes (risk phrase R50-53 (*): 'substances very toxic to aquatic organisms which may cause long term adverse effects in the aquatic environment') and 2 000 tonnes (risk phrase R51-53 (*): 'substances toxic to aquatic organisms which may cause long term adverse effects in the aquatic environment') for substances dangerous for the environment.

(*) Substances classified according to Council Directive 67/548/EEC of 27 June 1967 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances (OJ 196, 16.8.1967, p. 1). Directive as last amended by Directive 96/56/EC (OJ L 236, 18.9.1996, p. 35).

*ANNEX II***DECLARATION BY THE EUROPEAN COMMUNITY PURSUANT TO ARTICLE 29(4) OF THE
CONVENTION ON THE TRANSBOUNDARY EFFECTS OF INDUSTRIAL ACCIDENTS;
CONCERNING COMPETENCE**

In accordance with the EC Treaty, the objectives and principles of the Community's environmental policy are, in particular, to preserve and protect the quality of the environment and human health through preventive action. In pursuit of those objectives, the Council adopted Council Directive 82/501/EEC of 24 June 1982 on the major-accident hazards of certain industrial activities which has been replaced by Council Directive 96/82/EC of 9 December 1996 on the control of major-accident hazards involving dangerous substances. These instruments aim at the prevention of major-accident hazards involving dangerous substances and the limitations of their consequences for man and the environment and cover matters which are the subject of the Convention on the Transboundary Effects of Industrial Accidents. The Community will inform the depositary of any amendment to this Directive and of any further relevant development in the field covered by the Convention.

As regards the application of the Convention, the Community and its Member States are responsible, within their respective spheres of competence.

CONVENTION ON THE TRANSBOUNDARY EFFECTS OF
INDUSTRIAL ACCIDENTS

CONVENTION ON THE TRANSBOUNDARY EFFECTS OF INDUSTRIAL ACCIDENTS

Preamble

THE PARTIES TO THIS CONVENTION,

MINDFUL of the special importance, in the interest of present and future generations, of protecting human beings and the environment against the effects of industrial accidents,

RECOGNISING the importance and urgency of preventing serious adverse effects of industrial accidents on human beings and the environment, and of promoting all measures that stimulate the rational, economic and efficient use of preventive, preparedness and response measures to enable environmentally sound and sustainable economic development,

TAKING INTO ACCOUNT the fact that the effects of industrial accidents may make themselves felt across borders, and require cooperation among States,

AFFIRMING the need to promote active international cooperation among the States concerned before, during and after an accident, to enhance appropriate policies and to reinforce and coordinate action at all appropriate levels for promoting the prevention of, preparedness for and response to the transboundary effects of industrial accidents,

NOTING the importance and usefulness of bilateral and multilateral arrangements for the prevention of, preparedness for and response to the effects of industrial accidents,

CONSCIOUS of the role played in this respect by the United Nations Economic Commission for Europe (ECE) and recalling, *inter alia*, the ECE Code of Conduct on Accidental Pollution of Transboundary Inland Waters and the Convention on Environmental Impact Assessment in a Transboundary Context,

HAVING REGARD to the relevant provisions of the Final Act of the Conference on Security and Cooperation in Europe (CSCE), the Concluding Document of the Vienna Meeting of Representatives of the Participating States of the CSCE, and the outcome of the Sofia Meeting on the Protection of the Environment of the CSCE, as well as to pertinent activities and mechanisms in the United Nations Environment Programme (UNEP), in particular the APELL programme, in the International Labour Organisation (ILO), in particular the Code of Practice on the Prevention of Major Industrial Accidents, and in other relevant international organisations,

CONSIDERING the pertinent provisions of the Declaration of the United Nations Conference on the Human Environment, and in particular principle 21, according to which States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction,

TAKING ACCOUNT of the polluter-pays principle as a general principle of international environmental law,

UNDERLINING the principles of international law and custom, in particular the principles of good-neighbourliness, reciprocity, non-discrimination and good faith,

HAVE AGREED as follows:

*Article 1***Definitions**

For the purposes of this Convention:

- (a) 'industrial accident' means an event resulting from an uncontrolled development in the course of any activity involving hazardous substances either:
 - (i) in an installation, for example during manufacture, use, storage, handling, or disposal; or
 - (ii) during transportation in so far as it is covered by paragraph 2(d) of Article 2;
- (b) 'hazardous activity' means any activity in which one or more hazardous substances are present or may be present in quantities at or in excess of the threshold quantities listed in Annex I hereto, and which is capable of causing transboundary effects;
- (c) 'effects' means any direct or indirect, immediate or delayed adverse consequences caused by an industrial accident on; *inter alia*:
 - (i) human beings, flora and fauna;
 - (ii) soil, water, air and landscape;
 - (iii) the interaction between the factors in (i) and (ii);
 - (iv) material assets and cultural heritage, including historical monuments;
- (d) 'transboundary effects' means serious effects within the jurisdiction of a Party as a result of an industrial accident occurring within the jurisdiction of another Party;
- (e) 'operator' means any natural or legal person, including public authorities, in charge of an activity, e.g. supervising, planning to carry out or carrying out an activity;
- (f) 'Party' means, unless the text otherwise indicates, a Contracting Party to this Convention;
- (g) 'Party of origin' means any Party or Parties under whose jurisdiction an industrial accident occurs or is capable of occurring;
- (h) 'affected Party' means any Party or Parties affected or capable of being affected by transboundary effects of an industrial accident;
- (i) 'Parties concerned' means any Party of origin and any affected Party;
- (j) 'the public' means one or more natural or legal persons.

*Article 2***Scope**

1. This Convention shall apply to the prevention of, preparedness for and response to industrial accidents capable of causing transboundary effects, including the effects of such accidents caused by natural disasters, and to international cooperation concerning mutual assistance, research and development, exchange of information and exchange of technology in the area of prevention of, preparedness for and response to industrial accidents.
2. This Convention shall not apply to:
 - (a) nuclear accidents or radiological emergencies;
 - (b) accidents at military installations;
 - (c) dam failures, with the exception of the effects of industrial accidents caused by such failures;
 - (d) land-based transport accidents with the exception of:
 - (i) emergency response to such accidents;
 - (ii) transportation on the site of the hazardous activity;
 - (e) accidental release of genetically modified organisms;
 - (f) accidents caused by activities in the marine environment, including seabed exploration or exploitation;
 - (g) spills of oil or other harmful substances at sea.

*Article 3***General provisions**

1. The Parties shall, taking into account efforts already made at national and international levels, take appropriate measures and cooperate within the framework of this Convention, to protect human beings and the environment against industrial accidents by preventing such accidents as far as possible, by reducing their frequency and severity and by mitigating their effects. To this end, preventive, preparedness and response measures, including restoration measures, shall be applied.
2. The Parties shall, by means of exchange of information, consultation and other cooperative measures and without undue delay, develop and implement policies

and strategies for reducing the risks of industrial accidents and improving preventive, preparedness and response measures, including restoration measures, taking into account, in order to avoid unnecessary duplication, efforts already made at national and international levels.

3. The Parties shall ensure that the operator is obliged to take all measures necessary for the safe performance of the hazardous activity and for the prevention of industrial accidents.

4. To implement the provisions of this Convention, the Parties shall take appropriate legislative, regulatory, administrative and financial measures for the prevention of, preparedness for and response to industrial accidents.

5. The provisions of this Convention shall not prejudice any obligations of the Parties under international law with regard to industrial accidents and hazardous activities.

Article 4

Identification, consultation and advice

1. For the purpose of undertaking preventive measures and setting up preparedness measures, the Party of origin shall take measures, as appropriate, to identify hazardous activities within its jurisdiction and to ensure that affected Parties are notified of any such proposed or existing activity.

2. Parties concerned shall, at the initiative of any such Party, enter into discussions on the identification of those hazardous activities that are, reasonably, capable of causing transboundary effects. If the Parties concerned do not agree on whether an activity is such a hazardous activity, any such Party may, unless the Parties concerned agree on another method of resolving the question, submit that question to an inquiry commission in accordance with the provisions of Annex II hereto for advice.

3. The Parties shall, with respect to proposed or existing hazardous activities, apply the procedures set out in Annex III hereto.

4. When a hazardous activity is subject to an environmental impact assessment in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context and that assessment includes an evaluation of the transboundary effects of industrial accidents from the hazardous activity which is performed in conformity with the terms of this Convention, the final decision taken for the purposes of the Convention on

Environmental Impact Assessment in a Transboundary Context shall fulfil the relevant requirements of this Convention.

Article 5

Voluntary extension

Parties concerned should, at the initiative of any of them, enter into discussions on whether to treat an activity not covered by Annex I as a hazardous activity. Upon mutual agreement, they may use an advisory mechanism of their choice, or an inquiry commission in accordance with Annex II, to advise them. Where the Parties concerned so agree, this Convention, or any part thereof, shall apply to the activity in question as if it were a hazardous activity.

Article 6

Prevention

1. The Parties shall take appropriate measures for the prevention of industrial accidents, including measures to induce action by operators to reduce the risk of industrial accidents. Such measures may include, but are not limited to those referred to in Annex IV hereto.

2. With regard to any hazardous activity, the Party of origin shall require the operator to demonstrate the safe performance of the hazardous activity by the provision of information such as basic details of the process including but not limited to, analysis and evaluation as detailed in Annex V hereto.

Article 7

Decision-making on siting

Within the framework of its legal system, the Party of origin shall, with the objective of minimising the risk to the population and the environment of all affected Parties, seek the establishment of policies on the siting of new hazardous activities and on significant modifications to existing hazardous activities. Within the framework of their legal systems, the affected Parties shall seek the establishment of policies on significant developments in areas which could be affected by transboundary effects of an industrial accident arising out of a hazardous activity so as to minimise the risks involved. In elaborating and establishing these policies, the Parties should consider the matters set out in Annex V, paragraph 2, subparagraphs 1 to 8, and Annex VI hereto.

*Article 8***Emergency preparedness**

1. The Parties shall take appropriate measures to establish and maintain adequate emergency preparedness to respond to industrial accidents. The Parties shall ensure that preparedness measures are taken to mitigate transboundary effects of such accidents, on-site duties being undertaken by operators. These measures may include, but are not limited to those referred to in Annex VII hereto. In particular, the Parties concerned shall inform each other of their contingency plans.

2. The Party of origin shall ensure for hazardous activities the preparation and implementation of on-site contingency plans, including suitable measures for response and other measures to prevent and minimise transboundary effects. The Party of origin shall provide to the other Parties concerned the elements it has for the elaboration of contingency plans.

3. Each Party shall ensure for hazardous activities the preparation and implementation of off-site contingency plans covering measures to be taken within its territory to prevent and minimise transboundary effects. In preparing these plans, account shall be taken of the conclusions of analysis and evaluation, in particular the matters set out in Annex V, paragraph 2, subparagraphs 1 to 5. Parties concerned shall endeavour to make such plans compatible. Where appropriate, joint off-site contingency plans shall be drawn up in order to facilitate the adoption of adequate response measures.

4. Contingency plans should be reviewed regularly, or when circumstances so require, taking into account the experience gained in dealing with actual emergencies.

*Article 9***Information to, and participation of the public**

1. The Parties shall ensure that adequate information is given to the public in the areas capable of being affected by an industrial accident arising out of a hazardous activity. This information shall be transmitted through such channels as the Parties deem appropriate, shall include the elements contained in Annex VIII hereto and should take into account matters set out in Annex V, paragraph 2, subparagraphs 1 to 4 and 9.

2. The Party of origin shall, in accordance with the provisions of this Convention and whenever possible and appropriate, give the public in the areas capable of being affected an opportunity to participate in relevant procedures with the aim of making known its views and concerns on prevention and preparedness measures, and shall ensure that the opportunity given to the public of the affected Party is equivalent to that given to the public of the Party of origin.

3. The Parties shall, in accordance with their legal systems and, if desired, on a reciprocal basis provide natural or legal persons who are being or are capable of being adversely affected by the transboundary effects of an industrial accident in the territory of a Party, with access to, and treatment in the relevant administrative and judicial proceedings, including the possibilities of starting a legal action and appealing a decision affecting their rights, equivalent to those available to persons within their own jurisdiction.

*Article 10***Industrial accident notification systems**

1. The Parties shall, with the aim of obtaining and transmitting industrial accident notifications containing information needed to counteract transboundary effects, provide for the establishment and operation of compatible and efficient industrial accident notification systems at appropriate levels.

2. In the event of an industrial accident, or imminent threat thereof, which causes or is capable of causing transboundary effects, the Party of origin shall ensure that affected Parties are, without delay, notified at appropriate levels through the industrial accident notification systems. Such notification shall include the elements contained in Annex IX hereto.

3. The Parties concerned shall ensure that, in the event of an industrial accident or imminent threat thereof, the contingency plans prepared in accordance with Article 8 are activated as soon as possible and to the extent appropriate to the circumstances.

*Article 11***Response**

1. The Parties shall ensure that, in the event of an industrial accident, or imminent threat thereof, adequate

response measures are taken, as soon as possible and using the most efficient practices, to contain and minimise effects.

2. In the event of an industrial accident, or imminent threat thereof, which causes or is capable of causing transboundary effects, the Parties concerned shall ensure that the effects are assessed — where appropriate, jointly for the purpose of taking adequate response measures. The Parties concerned shall endeavour to coordinate their response measures.

Article 12

Mutual assistance

1. If a Party needs assistance in the event of an industrial accident, it may ask for assistance from other Parties, indicating the scope and type of assistance required. A Party to whom a request for assistance is directed shall promptly decide and inform the requesting Party whether it is in a position to render the assistance required and indicate the scope and terms of the assistance that might be rendered.

2. The Parties concerned shall cooperate to facilitate the prompt provision of assistance agreed to under paragraph 1 of this Article, including, where appropriate, action to minimise the consequences and effects of the industrial accident, and to provide general assistance. Where Parties do not have bilateral or multilateral agreements which cover their arrangements for providing mutual assistance, the assistance shall be rendered in accordance with Annex X hereto, unless the Parties agree otherwise.

Article 13

Responsibility and liability

The Parties shall support appropriate international efforts to elaborate rules, criteria and procedures in the field of responsibility and liability.

Article 14

Research and development

The Parties shall, as appropriate, initiate and cooperate in the conduct of research into, and in the development of methods and technologies for the prevention of, preparedness for and response to industrial accidents. For these purposes, the Parties shall encourage and actively promote scientific and technological cooperation,

including research into less hazardous processes aimed at limiting accident hazards and preventing and limiting the consequences of industrial accidents.

Article 15

Exchange of information

The Parties shall, at the multilateral or bilateral level, exchange reasonably obtainable information, including the elements contained in Annex XI hereto.

Article 16

Exchange of technology

1. The Parties shall, consistent with their laws, regulations and practices, facilitate the exchange of technology for the prevention of, preparedness for and response to the effects of industrial accidents, particularly through the promotion of:

- (a) exchange of available technology on various financial bases;
- (b) direct industrial contacts and cooperation;
- (c) exchange of information and experience;
- (d) provision of technical assistance.

2. In promoting the activities specified in paragraph 1, subparagraphs (a) to (d) of this Article, the Parties shall create favourable conditions by facilitating contacts and cooperation among appropriate organisations and individuals in both the private and the public sectors that are capable of providing technology, design and engineering services, equipment or finance.

Article 17

Competent authorities and points of contact

1. Each Party shall designate or establish one or more competent authorities for the purposes of this Convention.

2. Without prejudice to other arrangements at the bilateral or multilateral level, each Party shall designate or establish one point of contact for the purpose of industrial accident notifications pursuant to Article 10, and one point of contact for the purpose of mutual assistance pursuant to Article 12. These points of contact should preferably be the same.

3. Each Party shall, within three months of the date of entry into force of this Convention for that Party, inform the other Parties, through the Secretariat referred to in

Article 20, which body or bodies it has designated as its point(s) of contact and as its competent authority or authorities.

4. Each Party shall, within one month of the date of decision, inform the other Parties, through the Secretariat, of any changes regarding the designation(s) it has made under paragraph 3 of this Article.

5. Each Party shall keep its point of contact and industrial accident notification systems pursuant to Article 10 operational at all times.

6. Each Party shall keep its point of contact and the authorities responsible for making and receiving requests for, and accepting offers of assistance pursuant to Article 12 operational at all times.

Article 18

Conference of the Parties

1. The representatives of the Parties shall constitute the Conference of the Parties of this Convention and hold their meetings on a regular basis. The first meeting of the Conference of the Parties shall be convened not later than one year after the date of the entry into force of this Convention. Thereafter, a meeting of the Conference of the Parties shall be held at least once a year or at the written request of any Party, provided that, within six months of the request being communicated to them by the Secretariat, it is supported by at least one third of the Parties.

2. The Conference of the Parties shall:

- (a) review the implementation of this Convention;
- (b) carry out advisory functions aimed at strengthening the ability of Parties to prevent, prepare for and respond to the transboundary effects of industrial accidents, and at facilitating the provision of technical assistance and advice at the request of Parties faced with industrial accidents;
- (c) establish, as appropriate, working groups and other appropriate mechanisms to consider matters related to the implementation and development of this Convention and, to this end, to prepare appropriate studies and other documentation and submit recommendations for consideration by the Conference of the Parties;
- (d) fulfil such other functions as may be appropriate under the provisions of this Convention;
- (e) at its first meeting, consider and, by consensus, adopt rules of procedure for its meetings.

3. The Conference of the Parties, in discharging its functions, shall when it deems appropriate, also cooperate with other relevant international organisations.

4. The Conference of the Parties shall, at its first meeting, establish a programme of work, in particular with regard to the items contained in Annex XII hereto. The Conference of the Parties shall also decide on the method of work, including the use of national centres and cooperation with relevant international organisations and the establishment of a system with a view to facilitating the implementation of this Convention, in particular for mutual assistance in the event of an industrial accident, and building upon pertinent existing activities within relevant international organisations. As part of the programme of work, the Conference of the Parties shall review existing national, regional and international centres, and other bodies and programmes aimed at coordinating information and efforts in the prevention of, preparedness for and response to industrial accidents, with a view to determining what additional international institutions or centres may be needed to carry out the tasks listed in Annex XII.

5. The Conference of the Parties shall, at its first meeting, commence consideration of procedures to create more favourable conditions for the exchange of technology for the prevention of, preparedness for and response to the effects of industrial accidents.

6. The Conference of the Parties shall adopt guidelines and criteria to facilitate the identification of hazardous activities for the purposes of this Convention.

Article 19

Right to vote

1. Except as provided for in paragraph 2 of this Article, each Party to this Convention shall have one vote.

2. Regional economic integration organisations as defined in Article 27 shall, in matters within their competence, exercise their right to vote with a number of votes equal to the number of their member States which are Parties to this Convention. Such organisations shall not exercise their right to vote if their member States exercise theirs, and vice versa.

Article 20

Secretariat

The executive secretary of the Economic Commission for Europe shall carry out the following secretariat functions:

- (a) convene and prepare meetings of the Parties;
- (b) transmit to the Parties reports and other information received in accordance with the provisions of this Convention;
- (c) such other functions as may be determined by the Parties.

Article 21

Settlement of disputes

1. If a dispute arises between two or more Parties about the interpretation or application of this Convention, they shall seek a solution by negotiation or by any other method of dispute settlement acceptable to the parties to the dispute.
2. When signing, ratifying, accepting, approving or acceding to this Convention, or at any time thereafter, a Party may declare in writing to the Depositary that, for a dispute not resolved in accordance with paragraph 1 of this Article, it accepts one or both of the following means of dispute settlement as compulsory in relation to any Party accepting the same obligation:
 - (a) submission of the dispute to the International Court of Justice;
 - (b) arbitration in accordance with the procedure set out in Annex XIII hereto.
3. If the parties to the dispute have accepted both means of dispute settlement referred to in paragraph 2 of this Article, the dispute may be submitted only to the International Court of Justice, unless the parties to the dispute agree otherwise.

Article 22

Limitations on the supply of information

1. The provisions of this Convention shall not affect the rights or the obligations of Parties in accordance with their national laws, regulations, administrative provisions or accepted legal practices and applicable international regulations to protect information related to personal data, industrial and commercial secrecy, including intellectual property, or national security.
2. If a Party nevertheless decides to supply such protected information to another Party, the Party receiving such protected information shall respect the confidentiality of the information received and the conditions under which it is supplied, and shall only use that information for the purposes for which it was supplied.

Article 23

Implementation

The Parties shall report periodically on the implementation of this Convention.

Article 24

Bilateral and multilateral agreements

1. The Parties may, in order to implement their obligations under this Convention, continue existing or enter into new bilateral or multilateral agreements or other arrangements.
2. The provisions of this Convention shall not affect the right of Parties to take, by bilateral or multilateral agreement where appropriate, more stringent measures than those required by this Convention.

Article 25

Status of Annexes

The Annexes to this Convention form an integral part of the Convention.

Article 26

Amendments to the Convention

1. Any Party may propose amendments to this Convention.
2. The text of any proposed amendment to this Convention shall be submitted in writing to the Executive Secretary of the Economic Commission for Europe, who shall circulate it to all Parties. The Conference of the Parties shall discuss proposed amendments at its next annual meeting, provided that such proposals have been circulated to the Parties by the executive secretary of the Economic Commission for Europe at least 90 days in advance.
3. For amendments to this Convention — other than those to Annex I, for which the procedure is described in paragraph 4 of this Article:
 - (a) amendments shall be adopted by consensus of the Parties present at the meeting and shall be submitted by the Depositary to all Parties for ratification, acceptance or approval;
 - (b) instruments of ratification, acceptance or approval of amendments shall be deposited with the Depositary. Amendments adopted in accordance with this Article shall enter into force for Parties that have accepted

them on the 90th day following the day of receipt by the Depositary of the 16th instrument of ratification, acceptance or approval;

- (c) thereafter, amendments shall enter into force for any other Party on the 90th day after that Party deposits its instruments of ratification, acceptance or approval of the amendments.

4. For amendments to Annex I:

- (a) the Parties shall make every effort to reach agreement by consensus. If all efforts at consensus have been exhausted and no agreement reached, the amendments shall, as a last resort, be adopted by a nine-tenths majority vote of the Parties present and voting at the meeting. If adopted by the Conference of the Parties, the amendments shall be communicated to the Parties and recommended for approval;
- (b) on the expiry of 12 months from the date of their communication by the Executive Secretary of the Economic Commission for Europe, the amendments to Annex I shall become effective for those Parties to this Convention which have not submitted a notification in accordance with the provisions of paragraph 4(c) of this Article, provided that at least 16 Parties have not submitted such a notification;
- (c) any Party that is unable to approve an amendment to Annex I of this Convention shall so notify the executive secretary of the Economic Commission for Europe in writing within 12 months from the date of the communication of the adoption. The executive secretary shall without delay notify all Parties of any such notification received. A Party may at any time substitute an acceptance for its previous notification and the amendment to Annex I shall thereupon enter into force for that Party;
- (d) for the purpose of this paragraph 'Parties present and voting' means Parties present and casting an affirmative or negative vote.

Article 27

Signature

This Convention shall be open for signature at Helsinki from 17 to 18 March 1992 inclusive, and thereafter at United Nations headquarters in New York until 18 September 1992, by States members of the Economic Commission for Europe, as well as States having consultative status with the Economic Commission for Europe pursuant to paragraph 8 of Economic and Social Council Resolution 36 (IV) of 28 March 1947, and by regional economic integration organisations constituted by sovereign States members of the Economic

Commission for Europe to which their member States have transferred competence in respect of matters governed by this Convention, including the competence to enter into treaties in respect of these matters.

Article 28

Depositary

The Secretary-General of the United Nations shall act as the Depositary of this Convention.

Article 29

Ratification, acceptance, approval and accession

1. This Convention shall be subject to ratification, acceptance or approval by the signatory States and regional economic integration organisations referred to in Article 27.
2. This Convention shall be open for accession by the States and organisations referred to in Article 27.
3. Any organisations referred to in Article 27 which becomes Party to this Convention without any of its member States being a Party shall be bound by all the obligations under this Convention. In the case of such organisations, one or more of whose member States is a Party to this Convention, the organisation and its member States shall decide on their respective responsibilities for the performance of their obligations under this Convention. In such cases, the organisation and the member States shall not be entitled to exercise rights under this Convention concurrently.
4. In their instruments of ratification, acceptance, approval or accession, the regional economic integration organisations referred to in Article 27 shall declare the extent of their competence with respect to the matters governed by this Convention. These organisations shall also inform the Depositary of a substantial modification to the extent of their competence.

Article 30

Entry into force

1. This Convention shall enter into force on the 90th day after the date of deposit of the 16th instrument of ratification, acceptance, approval or accession.
2. For the purposes of paragraph 1 of this Article, any instrument deposited by an organisation referred to in Article 27 shall not be counted as additional to those deposited by States members of such an organisation.
3. For each State or organisation referred to in Article 27 which ratifies, accepts or approves this Convention or

accedes thereto after the deposit of this 16th instrument of ratification, acceptance, approval or accession, this Convention shall enter into force on the 90th day after the date of deposit by such State or organisation of its instrument of ratification, acceptance, approval or accession.

Article 31

Withdrawal

1. At any time after three years from the date on which this Convention has come into force with respect to a Party, that Party may withdraw from this Convention by giving written notification to the Depositary. Any such

withdrawal shall take effect on the 90th day after the date of the receipt of the notification by the Depositary.

2. Any such withdrawal shall not affect the application of Article 4 to an activity in respect of which a notification has been made pursuant to Article 4, paragraph 1, or a request for discussions has been made pursuant to Article 4, paragraph 2.

Article 32

Authentic texts

The original of this Convention, of which the English, French and Russian texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

IN WITNESS WHEREOF the undersigned, being duly authorised thereto, have signed this Convention.

DONE at Helsinki, this seventeenth day of March one thousand nine hundred and ninety-two.

ANNEX I

HAZARDOUS SUBSTANCES FOR THE PURPOSES OF DEFINING HAZARDOUS ACTIVITIES

The quantities set out below relate to each activity or group of activities. Where a range of quantities is given in Part I, the threshold quantities are the maximum quantities given in each range. Five years after the entry into force of this Convention, the lowest quantity given in each range shall become the threshold quantity, unless amended.

Where a substance or preparation named in Part II also falls within a category in Part I, the threshold quantity set out in Part II shall be used.

For the identification of hazardous activities, Parties shall take into consideration the foreseeable possibility of aggravation of the hazards involved and the quantities of the hazardous substances and their proximity, whether under the charge of one or more operators.

PART I

Categories of substances and preparations not specifically named in Part II

Category	Threshold quantity (Tonnes)
1. Flammable gases ^(1a) including LPG	200
2. Highly flammable liquids ^(1b)	50 000
3. Very toxic ^(1c)	20
4. Toxic ^(1d)	500-200
5. Oxidising ^(1e)	500-200
6. Explosive ^(1f)	200-50
7. Flammable liquids ^(1g) (handled under special conditions of pressure and temperature)	200
8. Dangerous for the environment ^(1h)	200

PART II

Named substances

Substance	Threshold quantity (Tonnes)
1. Ammonia	500
2. a) Ammonium nitrate ⁽²⁾	2 500
b) Ammonium nitrate in the form of fertilisers ⁽³⁾	10 000
3. Acrylonitrile	200
4. Chlorine	25
5. Ethylene oxide	50
6. Hydrogen cyanide	20
7. Hydrogen fluoride	50
8. Hydrogen sulphide	50
9. Sulphur dioxide	250
10. Sulphur trioxide	75
11. Lead alkyls	50
12. Phosgene	0,75
13. Methyl isocyanate	0,15

NOTES

⁽¹⁾ Indicative criteria.

In the absence of other appropriate criteria, Parties may use the following criteria when classifying substances or preparations for the purposes of Part I of this Annex:

(a) *Flammable gases*:

substances which in the gaseous state at normal pressure and mixed with air become flammable and the boiling point of which at normal pressure is 20 °C or below;

(b) *Highly flammable liquids*:

substances which have a flash point lower than 21 °C and the boiling point of which at normal pressure is above 20 °C;

(c) *Very toxic*:

substances with properties corresponding to those in Table 1 or Table 2 below, and which, owing to their physical and chemical properties, are capable of creating industrial accident hazards;

Table 1

LD ₅₀ (oral) ⁽¹⁾ mg/kg body weight LD ₅₀ ≤ 25	LD ₅₀ (dermal) ⁽²⁾ mg/kg body weight LD ₅₀ ≤ 50	LC ₅₀ ⁽³⁾ mg/l (inhalation) LC ₅₀ ≤ 0,5
⁽¹⁾ LD ₅₀ oral in rats. ⁽²⁾ LD ₅₀ dermal in rats or rabbits. ⁽³⁾ LC ₅₀ by inhalation (four hours) in rats.		

Table 2

Discriminating dose mg/kg body weight	< 5
where the acute oral toxicity in animals of the substance has been determined using the fixed-dose procedure.	

(d) *Toxic*:

substances with properties corresponding to those in Table 3 or Table 4 and having physical and chemical properties capable of creating industrial accident hazards.

Table 3

LD ₅₀ (oral) ⁽¹⁾ mg/kg body weight 25 < LD ₅₀ ≤ 200	LD ₅₀ (dermal) ⁽²⁾ mg/kg body weight 50 < LD ₅₀ ≤ 400	LC ₅₀ ⁽³⁾ mg/l (inhalation) 0,5 < LC ₅₀ ≤ 2
⁽¹⁾ LD ₅₀ oral in rats. ⁽²⁾ LD ₅₀ dermal in rats or rabbits. ⁽³⁾ LC ₅₀ by inhalation (four hours) in rats.		

Table 4

Discriminating dose mg/kg body weight	= 5
where the acute oral toxicity in animals of the substance has been determined using the fixed-dose procedure.	

- (e) *Oxidising*:
substances which give rise to highly exothermic reaction when in contact with other substances, particularly flammable substances;
- (f) *Explosive*:
substances which may explode under the effect of flame or which are more sensitive to shocks or friction than dinitrobenzene;
- (g) *Flammable liquids*:
substances which have a flash point lower than 55 °C and which remain liquid under pressure, where particular processing conditions, such as high pressure and high temperature, may create industrial accident hazards;
- (h) *Dangerous for the environment*:
substances showing the values for acute toxicity to the aquatic environment corresponding to Table 5.

Table 5

LC ₅₀ ⁽¹⁾ mg/l LC ₅₀ ≤ 10	EC ₅₀ ⁽²⁾ mg/l EC ₅₀ ≤ 10	IC ₅₀ ⁽³⁾ mg/l IC ₅₀ ≤ 10
⁽¹⁾ LC ₅₀ fish (96 hours). ⁽²⁾ EC ₅₀ daphnia (48 hours). ⁽³⁾ IC ₅₀ algae (72 hours).		
where the substance is not readily degradable, or the log Pow > 3,0 (unless the experimentally determined BCF < 100).		

- (i) LD — lethal dose;
- (j) LC — lethal concentration;
- (k) EC — effective concentration;
- (l) IC — inhibiting concentration;
- (m) Pow — partition coefficient octanol/water;
- (n) BCF — bioconcentration factor.
- ⁽²⁾ This applies to ammonium nitrate and mixtures of ammonium nitrate where the nitrogen content derived from the ammonium nitrate is > 28 % by weight, and to aqueous solutions of ammonium nitrate where the concentration of ammonium nitrate is > 90 % by weight.
- ⁽³⁾ This applies to straight ammonium nitrate fertilisers and to compound fertilisers where the nitrogen content derived from the ammonium nitrate is > 28 % by weight (a compound fertiliser contains ammonium nitrate together with phosphate and/or potash).
- ⁽⁴⁾ Mixtures and preparations containing such substances shall be treated in the same way as the pure substances unless they no longer exhibit equivalent properties and are not capable of producing transboundary effects.

ANNEX II

Inquiry commission procedure pursuant to Articles 4 and 5

1. The requesting Party/Parties shall notify the Secretariat that it/they is/are submitting question(s) to an inquiry commission established in accordance with the provisions of this Annex. The notification shall state the subject matter of the inquiry. The Secretariat shall immediately inform all Parties to the Convention of this submission.
2. The inquiry commission shall consist of three members. Both the requesting party and the other party to the inquiry procedure shall appoint a scientific or technical expert and the two experts so appointed shall designate by common agreement a third expert, who shall be the president of the inquiry commission. The latter shall not be a national of one of the parties to the inquiry procedure, nor have dealt with the case in any other capacity.
3. If the president of the inquiry commission has not been designated within two months of the appointment of the second expert, the executive secretary of the Economic Commission for Europe shall, at the request of either party, designate the president within a further two-month period.
4. If one of the parties to the inquiry procedure does not appoint an expert within one month of its receipt of the notification by the Secretariat, the other party may inform the executive secretary of the Economic Commission for Europe, who shall designate the president of the inquiry commission within a further two-months period. Upon designation, the president of the inquiry commission shall request the party which has not appointed an expert to do so within one month. If it fails to do so within that period, the president shall inform the Executive Secretary of the Economic Commission for Europe who shall make this appointment within a further two-month period.
5. The inquiry commission shall adopt its own rules of procedure.
6. The inquiry commission may take all appropriate measures in order to carry out its functions.
7. The parties to the inquiry procedure shall facilitate the work of the inquiry commission and in particular shall, using all means at their disposal:
 - (a) provide the inquiry commission with all relevant documents, facilities and information;
 - (b) enable the inquiry commission, where necessary, to call witness or experts and receive their evidence.
8. The parties and the experts shall protect the confidentiality of any information they receive in confidence during the work of the inquiry commission.
9. If one of the parties to the inquiry procedure does not appear before the inquiry commission or fails to present its case, the other party may request the inquiry commission to continue the proceedings and to complete its work. Absence of a party or failure of a party to present its case shall not constitute a bar to the continuation and completion of the work of the inquiry commission.
10. Unless the inquiry commission determines otherwise because of the particular circumstances of the matter, the expenses of the inquiry commission, including the remuneration of its members, shall be borne equally by the parties to the inquiry procedure. The inquiry commission shall keep a record of all its expenses and shall furnish a final statement thereof to the parties.
11. Any Party which has an interest of a factual nature in the subject matter of the inquiry procedure and which may be affected by an opinion in the matter may intervene in the proceedings with the consent of the inquiry commission.

12. The decisions of the inquiry commission on matters of the procedure shall be taken by majority vote of its members. The final opinion of the inquiry commission shall reflect the view of the majority of its members and shall include any dissenting view.
 13. The inquiry commission shall present its final opinion within two months of the date on which it was established, unless it finds it necessary to extend this time limit for a period which should not exceed two months.
 14. The final opinion of the inquiry commission shall be based on accepted scientific principles. The final opinion shall be transmitted by the inquiry commission to the parties to the inquiry procedure and to the Secretariat.
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ANNEX III

PROCEDURES PURSUANT TO ARTICLE 4

1. A Party of origin may request consultations with another Party, in accordance with paragraphs 2 to 5 of this Annex, in order to determine whether that Party is an affected Party.
2. For a proposed or existing hazardous activity, the Party of origin shall, for the purposes of ensuring adequate and effective consultations, provide for the notification at appropriate levels of any Party that it considers may be an affected party as early as possible and no later than when informing its own public about that proposed or existing activity. For existing hazardous activities such notification shall be provided no later than two years after the entry into force of this Convention for a Party of origin.
3. The notification shall contain, *inter alia*:
 - (a) information on the hazardous activity, including any available information or report, such as information produced in accordance with Article 6, on its possible transboundary effects in the event of an industrial accident;
 - (b) an indication of a reasonable time within which a response under paragraph 4 of this Annex is required, taking into account the nature of the activity;and may include the information set out in paragraph 6 of this Annex.
4. The notified Parties shall respond to the Party of origin within the time specified in the notification, acknowledging receipt of the notification and indicating whether they intend to enter into consultation.
5. If a notified Party indicates that it does not intend to enter into consultation, or if it does not respond within the time specified in the notification, the provisions set down in the following paragraphs of this Annex shall not apply. In such circumstances, the right of a Party of origin to determine whether to carry out an assessment and analysis on the basis of its national law and practice is not prejudiced.
6. Upon receipt of a response from a notified Party indicating its desire to enter into consultation, the Party of origin shall, if it has not already done so, provide to the notified Party:
 - (a) relevant information regarding the time schedule for analysis, including an indication of the time schedule for the transmittal of comments;
 - (b) relevant information on the hazardous activity and its transboundary effects in the event of an industrial accident;
 - (c) the opportunity to participate in evaluations of the information or any report demonstrating possible transboundary effects.
7. An affected Party shall, at the request of the Party of origin, provide the latter with reasonably obtainable information relating to the area under the jurisdiction of the affected party capable of being affected, where such information is necessary for the preparation of the assessment and analysis and measures. The information shall be furnished promptly and, as appropriate, through a joint body where one exists.
8. The Party of origin shall furnish the affected party directly, as appropriate, or, where one exists, through a joint body with the analysis and evaluation documentation as described in Annex V, paragraphs 1 and 2.
9. The Parties concerned shall inform the public in areas reasonably capable of being affected by the hazardous activity and shall arrange for the distribution of the analysis and evaluation documentation to it and to authorities in the relevant areas. The parties shall ensure them an opportunity for making

comments on, or objections to, the hazardous activity and shall arrange for their views to be submitted to the competent authority of the Party of origin, either directly to that authority or, where appropriate, through the Party of origin, within a reasonable time.

10. The Party of origin shall, after completion of the analysis and evaluation documentation, enter without undue delay into consultations with the affected Party concerning, *inter alia*, the transboundary effects of the hazardous activity in the event of an industrial accident, and measures to reduce or eliminate its effects. The consultations may relate to:
 - (a) possible alternatives to the hazardous activity, including the no-action alternative, and possible measures to mitigate transboundary effects at the expense of the Party of origin;
 - (b) other forms of possible mutual assistance for reducing any transboundary effects;
 - (c) any other appropriate matters.

The Parties concerned shall, on the commencement of such consultations, agree on a reasonable time-frame for the duration of the consultation period. Any such consultations may be conducted through an appropriate joint body, where one exists.

11. The Parties concerned shall ensure that due account is taken of the analysis and evaluation, as well as of the comments received pursuant to paragraph 9 of this Annex and of the outcome of the consultations referred to in paragraph 10 of this Annex.
 12. The Party of origin shall notify the affected Parties of any decision on the activity, along with the reasons and considerations on which it was based.
 13. If, after additional and relevant information concerning the transboundary effects of a hazardous activity and which was not available at the time consultations were held with respect to that activity, becomes available to a Party concerned, that Party shall immediately inform the other Party or Parties concerned. If one of the Parties concerned so requests, renewed consultations shall be held.
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ANNEX IV

PREVENTIVE MEASURES PURSUANT TO ARTICLE 6

The following measures may be carried out, depending on national laws and practices, by Parties, competent authorities, operators, or by joint efforts:

1. the setting of general or specific safety objectives;
 2. the adoption of legislative provisions or guidelines concerning safety measures and safety standards;
 3. the identification of those hazardous activities which require special preventive measures, which may include a licensing or authorisation system;
 4. the evaluation of risk analyses or of safety studies for hazardous activities and an action plan for the implementation of necessary measures;
 5. the provision to the competent authorities of the information needed to assess risks;
 6. the application of the most appropriate technology in order to prevent industrial accidents and protect human beings and the environment;
 7. the undertaking, in order to prevent industrial accidents, of the appropriate education and training of all persons engaged in hazardous activities on-site under both normal and abnormal conditions;
 8. the establishment of internal managerial structures and practices designed to implement and maintain safety regulations effectively;
 9. the monitoring and auditing of hazardous activities and the carrying out of inspections.
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ANNEX V

ANALYSIS AND EVALUATION

1. The analysis and evaluation of the hazardous activity should be performed with a scope and to a depth which vary depending on the purpose for which they are carried out.
2. The following table illustrates, for the purposes of the related Articles, matters which should be considered in the analysis and evaluation, for the purposes listed:

Purpose of analysis	Matters to be considered
Emergency planning under Article 8	1. The quantities and properties of hazardous substances on the site 2. Brief descriptive scenarios of a representative sample of industrial accidents possibly arising from the hazardous activity, including an indication of the likelihood of each 3. For each scenario: (a) the approximate quantity of a release; (b) the extent and severity of the resulting consequences both for people and for the non-human environment in favourable and unfavourable conditions, including the extent of resulting hazard zones; (c) the time-scale within which the industrial accident could develop from the initiating event; (d) any action which could be taken to minimise the likelihood of escalation 4. The size and distribution of the population in the vicinity, including any large concentrations of people potentially in the hazard zone 5. The age, mobility and susceptibility of that population
Decision-making on siting under Article 7	In addition to items 1 to 5 above: 6. The severity of the harm inflicted on people and the environment, depending on the nature and circumstances of the release 7. The distance from the location of the hazardous activity at which harmful effects on people and the environment may reasonably occur in the event of an industrial accident 8. The same information not only for the present situation but also for planned or reasonably foreseeable future developments
Information to the public under Article 9	In addition to items 1 to 4 above: 9. The people who may be affected by an industrial accident

Purpose of analysis	Matters to be considered
Preventive measures under Article 6	In addition to items 4 to 9 above, more detailed versions of the descriptions and assessments set out in items 1 to 3 will be needed for preventive measures. In addition to those descriptions and assessments, the following matters should also be covered 10. The conditions and quantities in which hazardous materials are handled 11. A list of the scenarios for the types of industrial accidents with serious effects, to include examples covering the full range of incident size and the possibility of effects from adjacent activities 12. For each scenario, a description of the events which could initiate an industrial accident and the steps whereby it could escalate 13. An assessment, at least in general terms, of the likelihood of each step occurring, taking into account the arrangements in 14 14. A description of the preventive measures in terms of both equipment and procedures designed to minimise the likelihood of each step occurring 15. An assessment of the effects that deviations from normal operating conditions could have, and the consequent arrangements for safe shut-down of the hazardous activity or any part thereof in an emergency, and of the need for staff training to ensure that potentially serious deviations are recognised at an early stage and appropriate action taken 16. An assessment of the extent to which modifications, repair work and maintenance work on the hazardous activity could place the control measures at risk, and the consequent arrangements to ensure that control is maintained

*ANNEX VI***DECISION-MAKING ON SITING PURSUANT TO ARTICLE 7**

The following illustrates the matters which should be considered pursuant to Article 7:

1. the results of risk analysis and evaluation, including an evaluation pursuant to Annex V of the physical characteristics of the area in which the hazardous activity being planned;
 2. the results of consultations and public participation processes;
 3. an analysis of the increase or decrease of the risk caused by any development in the territory of the affected Party in relation to an existing hazardous activity in the territory of the Party of origin;
 4. the evaluation of the environmental risks, including any transboundary effects;
 5. an evaluation of the new hazardous activities which could be a source of risk;
 6. a consideration of the siting of new, and significant modifications to existing hazardous activities at a safe distance from existing centres of population, as well as the establishment of a safety area around hazardous activities; within such areas, developments which would increase the populations at risk, or otherwise increase the severity of the risk, should be closely examined.
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ANNEX VII

EMERGENCY PREPAREDNESS MEASURES PURSUANT TO ARTICLE 8

1. All contingency plans, both on- and off-site, should be coordinated to provide a comprehensive and effective response to industrial accidents.
 2. The contingency plans should include the actions necessary to localise emergencies and to prevent or minimise their transboundary effects. They should also include arrangements for warning people and, where appropriate, arrangements for their evacuation, other protective or rescue actions and health services.
 3. Contingency plans should give on-site personnel, people who might be affected off site and rescue forces, details of technical and organisational procedures which are appropriate for response in the event of an industrial accident capable of having transboundary effects and to prevent and minimise effects on people and the environment, both on and off site.
 4. Examples of matters which could be covered by on-site contingency plans include:
 - (a) organisational roles and responsibilities on site for dealing with an emergency;
 - (b) a description of the action which should be taken in the event of an industrial accident, or an imminent threat thereof, in order to control the condition or event, or details of where such a description can be found;
 - (c) a description of the equipment and resources available;
 - (d) arrangements for providing early warning of industrial accidents to the public authority responsible for the off-site emergency response, including the type of information which should be included in an initial warning and the arrangements for providing more detailed information as it becomes available;
 - (e) arrangements for training personnel in the duties they will be expected to perform.
 5. Examples of matters which could be covered by off-site contingency plans include:
 - (a) organisational roles and responsibilities off site for dealing with an emergency, including how integration with on-site plans is to be achieved;
 - (b) methods and procedures to be followed by emergency and medical personnel;
 - (c) methods for rapidly determining the affected area;
 - (d) arrangements for ensuring that prompt industrial accident notification is made to affected or potentially affected Parties and that that liaison is maintained subsequently;
 - (e) identification of resources necessary to implement the plan and the arrangements for coordination;
 - (f) arrangements for providing information to the public including, where appropriate, the arrangements for reinforcing and repeating the information provided to the public pursuant to Article 9;
 - (g) arrangements for training and exercises.
 6. Contingency plans could include the measures for: treatment; collection; clean-up; storage; removal and safe disposal of hazardous substances and contaminated material; and restoration.
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*ANNEX VIII***INFORMATION TO THE PUBLIC PURSUANT TO ARTICLE 9**

1. The name of the company, address of the hazardous activity and identification by position held of the person giving the information.
 2. An explanation in simple terms of the hazardous activity, including the risks.
 3. The common names or the generic names or the general danger classification of the substances and preparations which are involved in the hazardous activity, with an indication of their principal dangerous characteristics.
 4. General information resulting from an environmental impact assessment, if available and relevant.
 5. The general information relating to the nature of an industrial accident that could possibly occur in the hazardous activity, including its potential effects on the population and the environment.
 6. Adequate information on how the affected population will be warned and kept informed in the event of an industrial accident.
 7. Adequate information on the actions the affected population should take and on the behaviour they should adopt in the event of an industrial accident.
 8. Adequate information on arrangements made regarding the hazardous activity, including liaison with the emergency services, to deal with industrial accidents, to reduce the severity of the industrial accidents and to mitigate their effects.
 9. General information on the emergency services' off-site contingency plan, drawn up to cope with any off-site effects, including the transboundary effects of an industrial accident.
 10. General information on special requirements and conditions to which the hazardous activity is subject according the relevant national regulations and/or administrative provisions, including licensing or authorisation systems;
 11. Details of where further relevant information can be obtained.
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ANNEX IX

INDUSTRIAL ACCIDENT NOTIFICATION SYSTEMS PURSUANT TO ARTICLE 10

1. The industrial accident notification systems shall enable the speediest possible transmission of data and forecasts according to previously determined codes using compatible data-transmission and data-treatment systems for emergency warning and response, and for measures to minimise and contain the consequences of transboundary effects, taking account of different needs at different levels.
 2. The industrial accident notification shall include the following:
 - (a) the type and magnitude of the industrial accident, the hazardous substances involved (if known), and the severity of its possible effects;
 - (b) the time of occurrence and exact location of the accident;
 - (c) such other available information as necessary for an efficient response to the industrial accident.
 3. The industrial accident notification shall be supplemented at appropriate intervals, or whenever required, by further relevant information on the development of the situation concerning transboundary effects.
 4. Regular texts and reviews of the effectiveness of the industrial accident notification systems shall be undertaken, including the regular training of the personnel involved. Where appropriate, such tests, reviews and training shall be performed jointly.
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ANNEX X

MUTUAL ASSISTANCE PURSUANT TO ARTICLE 12

1. The overall direction, control, coordination and supervision of the assistance is the responsibility of the requesting Party. The personnel involved in the assisting operation shall act in accordance with the relevant laws of the requesting Party. The appropriate authorities of the requesting Party shall cooperate with the authority designated by the assisting Party, pursuant to Article 17, as being in charge of the immediate operational supervision of the personnel and the equipment provided by the assisting Party.
 2. The requesting Party shall, to the extent of its capabilities, provide local facilities and services for the proper and effective administration of the assistance, and shall ensure the protection of personnel, equipment and materials brought into its territory by, or on behalf of, the assisting Party for such a purpose.
 3. Unless otherwise agreed by the Parties concerned, assistance shall be provided at the expense of the requesting Party. The assisting Party may at any time waive wholly or partly the reimbursement of costs.
 4. The requesting Party shall use its best efforts to afford to the assisting Party and persons acting on its behalf the privileges, immunities or facilities necessary for the expeditious performance of their assistance functions. The requesting Party shall not be required to apply this provision to its own nationals or permanent residents or to afford them the privileges and immunities referred to above.
 5. A Party shall, at the request of the requesting or assisting Party, endeavour to facilitate the transit through its territory of duly notified personnel, equipment and property involved in the assistance to and from the requesting Party.
 6. The requesting Party shall facilitate the entry into, stay in and departure from its national territory of duly notified personnel and of equipment and property involved in the assistance.
 7. With regard to acts resulting directly from the assistance provided, the requesting Party shall, in respect of the death of or injury to persons, damage to or loss of property, or damage to the environment caused within its territory in the course of the provision of the assistance requested, hold harmless and indemnify the assisting Party or persons acting on its behalf and compensate them for death or injury suffered by them and for loss of or damage to equipment or other property involved in the assistance. The requesting Party shall be responsible for dealing with claims brought by third parties against the assisting Party or persons acting on its behalf.
 8. The Parties concerned shall cooperate closely in order to facilitate the settlement of legal proceedings and claims which could result from assistance operations.
 9. Any Party may request assistance relating to the medical treatment or the temporary relocation in the territory of another Party of persons involved in an accident.
 10. The affected or requesting Party may at any time, after appropriate consultations and by notification, request the termination of assistance received or provided under this Convention. Once such a request has been made, the Parties concerned shall consult one another with a view to making arrangements for the proper termination of the assistance.
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*ANNEX XI***EXCHANGE OF INFORMATION PURSUANT TO ARTICLE 15**

Information shall include the following elements, which can also be the subject of multilateral and bilateral cooperation:

- (a) legislative and administrative measures, policies, objectives and priorities for prevention, preparedness and response, scientific activities and technical measures to reduce the risk of industrial accidents from hazardous activities, including the mitigation of transboundary effects;
 - (b) measures and contingency plans at the appropriate level affecting other Parties;
 - (c) programmes for monitoring, planning, research and development, including their implementation and surveillance;
 - (d) measures taken regarding prevention of, preparedness for and response to industrial accidents;
 - (e) experience with industrial accidents and cooperation in response to industrial accidents with transboundary effects;
 - (f) the development and application of the best available technologies for improved environmental protection and safety;
 - (g) emergency preparedness and response;
 - (h) methods used for the prediction of risks, including criteria for the monitoring and assessment of transboundary effects.
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ANNEX XII

TASKS FOR MUTUAL ASSISTANCE PURSUANT TO ARTICLE 18, PARAGRAPH 4

1. Information and data collection and dissemination

- (a) establishment and operation of an industrial accident notification system that can provide information on industrial accidents and on experts, in order to involve the experts as rapidly as possible in providing assistance;
- (b) establishment and operation of a data bank for the reception, processing and distribution of necessary information on industrial accidents, including their effects, and also on measures applied and their effectiveness;
- (c) elaboration and maintenance of a list of hazardous substances, including their relevant characteristics, and of information on how to deal with those in the event of an industrial accident;
- (d) establishment and maintenance of a register of experts to provide consultative and other kinds of assistance regarding preventive, preparedness and response measures, including restoration measures;
- (e) maintenance of a list of hazardous activities;
- (f) production and maintenance of a list of hazardous substances covered by the provisions of Annex I, Part I.

2. Research, training and methodologies

- (a) development and provision of models based on experience from industrial accidents, and scenarios for preventive, preparedness and response measures;
- (b) promotion of education and training, organisation of international symposia and promotion of cooperation in research and development.

3. Technical assistance

- (a) fulfillment of advisory functions aimed at strengthening the ability to apply preventive, preparedness and response measures;
- (b) undertaking, at the request of a Party, of inspections of its hazardous activities and the provision of assistance in organising its national inspections according to the requirements of this Convention.

4. Assistance in the case of an emergency

Provision, at the request of a Party, of assistance by, *inter alia*, sending experts to the site of an industrial accident to provide consultative and other kinds of assistance in response to the industrial accident.

ANNEX XIII

ARBITRATION

1. The claimant Party or Parties shall notify the Secretariat that the Parties have agreed to submit the dispute to arbitration pursuant to Article 21, paragraph 2 of this Convention. The notification shall state the subject matter of arbitration and include, in particular, the Articles of this Convention, the interpretation or application of which is at issue. The Secretariat shall forward the information received to all Parties to this Convention.
2. The arbitral tribunal shall consist of three members. Both the claimant Party or Parties and the other Party or Parties to the dispute shall appoint an arbitrator, and the two arbitrators so appointed shall designate by common agreement the third arbitrator, who shall be the president of the arbitral tribunal. The latter shall not be a national of one of the parties to the dispute, nor have his or her usual place of residence in the territory of one of these parties, nor be employed by any of them, nor have dealt with the case in any other capacity.
3. If the president of the arbitral tribunal has not been designated within two months of the appointment of the second arbitrator, the executive secretary of the Economic Commission for Europe shall, at the request of either party to the dispute, designate the president within a further two-month period.
4. If one of the parties to the dispute does not appoint an arbitrator within two months of the receipt of the request, the other party may so inform the executive secretary of the Economic Commission for Europe, who shall designate the president of the arbitral tribunal within a further two-month period. Upon designation, the president of the arbitral tribunal shall request the party which has not appointed an arbitrator to do so within two months. If it fails to do so within that period, the president shall inform the executive secretary of the Economic Commission for Europe, who shall make this appointment within a further two-month period.
5. The arbitral tribunal shall render its decision in accordance with international law and in accordance with the provisions of this Convention.
6. Any arbitral tribunal constituted under the provisions set out herein shall draw up its own rules of procedure.
7. The decisions of the arbitral tribunal, both on procedure and on substance, shall be taken by majority vote of its members.
8. The tribunal may take all appropriate measures to establish the facts.
9. The parties to the dispute shall facilitate the work of the arbitral tribunal and, in particular shall, using all means at their disposal:
 - (a) provide the tribunal with all relevant documents, facilities and information;
 - (b) enable the tribunal, where necessary, to call witnesses or experts and receive their evidence.
10. The parties to the dispute and the arbitrators shall protect the confidentiality of any information they receive in confidence during the proceedings of the arbitral tribunal.
11. The arbitral tribunal may, at the request of one of the parties, recommend interim measures of protection.
12. If one of the parties to the dispute does not appear before the arbitral tribunal or fails to defend its case, the other party may request the tribunal to continue the proceedings and to render its final decision. Absence of a party or failure of a party to defend its case shall not constitute a bar to the proceedings.
13. The arbitral tribunal may hear and determine counter-claims arising directly out of the subject matter of the dispute.

14. Unless the arbitral tribunal determines otherwise because of the particular circumstances of the case, the expenses of the tribunal, including the remuneration of its members, shall be borne equally by the parties to the dispute. The tribunal shall keep a record of all its expenses and shall furnish a final statement thereof to the parties to the dispute.
 15. Any Party to this Convention which has an interest of a legal nature in the subject matter of the dispute and which may be affected by a decision in the case, may intervene in the proceedings with the consent of the tribunal.
 16. The arbitral tribunal shall render its award within five months of the date on which it is established unless it finds it necessary to extend the time limit for a period which should not exceed five months.
 17. The award of the arbitral tribunal shall be accompanied by a statement of reasons. It shall be final and binding upon all parties to the dispute. The award will be transmitted by the arbitral tribunal to the parties to the dispute and to the Secretariat. The Secretariat will forward the information received to all Parties to this Convention.
 18. Any dispute which may arise between the parties concerning the interpretation or execution of the award may be submitted by either party to the tribunal which made the award or, if the latter cannot be seized thereof, to another tribunal constituted for this purpose in the same manner as the first.
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COUNCIL DECISION

of 23 March 1998

on the conclusion by the European Community of the Protocol to the 1979 Convention on long-range transboundary air pollution on further reductions of sulphur emissions

(98/686/EC)

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 130s(1), in conjunction with the first sentence of Article 228(2) and the first subparagraph of Article 228(3) thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the opinion of the European Parliament ⁽²⁾,

Whereas the Community signed, on 14 June 1994, the Protocol to the 1979 Convention on long-range transboundary air pollution on further reductions of sulphur emissions (hereinafter 'the Protocol');

Whereas the Protocol seeks to establish ceilings for sulphur emissions for all contracting parties to the Convention;

Whereas the measures envisaged in the Protocol contribute to achieving objectives of the Community policy on the environment;

Whereas the Community and the Member States cooperate, in the framework of their respective competences, with third countries and the competent international organisations;

Whereas, in consequence, the Community should approve the Protocol,

HAS ADOPTED THIS DECISION:

Article 1

The Protocol to the 1979 Convention on long-range transboundary air pollution on further reductions of sulphur emissions, signed on 14 June 1994, is hereby approved on behalf of the Community.

The text of the Protocol is attached to this Decision.

The following Declaration shall be deposited with the instruments of approval:

'The European Community states that the ceiling for emissions and the weighted average percentage of the European Community ought not to exceed the sum of the obligations of the Member States of the European Union which have ratified the Protocol, while stressing that all its Member States must reduce their SO₂ emissions in accordance with the emission ceilings set in Annex II to the Protocol and in line with the relevant Community legislation.'

Article 2

The President of the Council is hereby authorised to designate the person empowered to deposit the instruments of approval and the Declaration referred to in Article 1 with the Secretary General of the United Nations, in accordance with Article 14 of the Protocol.

Article 3

This Decision will be published in the *Official Journal of the European Communities*.

Done at Brussels, 23 March 1998.

For the Council

The President

M. MEACHER

⁽¹⁾ OJ C 190, 21.6.1997, p. 13.

⁽²⁾ OJ C 14, 19.1.1998.

**PROTOCOL TO THE 1979 CONVENTION ON LONG-RANGE
TRANSBOUNDARY AIR POLLUTION ON FURTHER
REDUCTION OF SULPHUR EMISSIONS**

**PROTOCOL TO THE 1979 CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR
POLLUTION ON FURTHER REDUCTION OF SULPHUR EMISSIONS**

THE PARTIES,

DETERMINED to implement the Convention on Long-range Transboundary Air Pollution,

CONCERNED that emissions of sulphur and other air pollutants continue to be transported across international boundaries and, in exposed parts of Europe and North America, are causing widespread damage to natural resources of vital environmental and economic importance, such as forests, soils and waters, and to materials, including historic monuments, and, under certain circumstances, have harmful effects on human health,

RESOLVED to take precautionary measures to anticipate, prevent or minimise emissions of air pollutants and mitigate their adverse effects,

CONVINCED that where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that such precautionary measures to deal with emissions of air pollutants should be cost-effective,

MINDFUL that measures to control emissions of sulphur and other air pollutants would also contribute to the protection of the sensitive Arctic environment,

CONSIDERING that the predominant sources of air pollution contributing to the acidification of the environment are the combustion of fossil fuels for energy production, and the main technological processes in various industrial sectors, as well as transport, which lead to emissions of sulphur, nitrogen oxides, and other pollutants,

CONSCIOUS of the need for a cost-effective regional approach to combating air pollution that takes account of the variations in effects and abatement costs between countries,

DESIRING to take further and more effective action to control and reduce sulphur emissions,

COGNISANT that any sulphur control policy, however cost-effective it may be at the regional level, will result in a relatively heavy economic burden on countries with economies that are in transition to a market economy,

BEARING IN MIND that measures taken to reduce sulphur emissions should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international competition and trade,

TAKING INTO CONSIDERATION existing scientific and technical data on emissions, atmospheric processes and effects on the environment of sulphur oxides, as well as on abatement costs,

AWARE that, in addition to emissions of sulphur, emissions of nitrogen oxides and of ammonia are also causing acidification of the environment,

NOTING that under the United Nations Framework Convention on Climate Change, adopted in New York on 9 May 1992, there is agreement to establish national policies and take corresponding measures to combat climate change, which can be expected to lead to reductions of sulphur emissions,

AFFIRMING the need to ensure environmentally sound and sustainable development,

RECOGNISING the need to continue scientific and technical cooperation to elaborate further the approach based on critical loads and critical levels, including efforts to assess several air pollutants and various effects on the environment, materials and human health,

UNDERLINING that scientific and technical knowledge is developing and that it will be necessary to take such developments into account when reviewing the adequacy of the obligations entered into under the present Protocol and deciding on further action,

ACKNOWLEDGING the Protocol on the Reduction of Sulphur Emissions or Their Transboundary Fluxes by at least 30 per cent, adopted in Helsinki on 8 July 1985, and the measures already taken by many countries which have had the effect of reducing sulphur emissions,

HAVE AGREED AS FOLLOWS:

Article 1

DEFINITIONS

For the purposes of the present Protocol,

1. 'Convention' means the Convention on long-range transboundary air pollution, adopted in Geneva on 13 November 1979;
2. 'EMEP' means the cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe;
3. 'executive body' means the executive body for the Convention constituted under Article 10, paragraph 1, of the Convention;
4. 'Commission' means the United Nations Economic Commission for Europe;
5. 'Parties' means, unless the context otherwise requires, the Parties to the present Protocol;
6. 'geographical scope of EMEP' means the area defined in Article 1, paragraph 4, of the Protocol to the 1979 Convention on long-range transboundary air pollution on long-term financing of the cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe (EMEP), adopted in Geneva on 28 September 1984;
7. 'SOMA' means a sulphur oxides management area designated in Annex III under the conditions laid down in Article 2, paragraph 3;
8. 'critical load' means a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge;
9. 'critical levels' means the concentration of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur, according to present knowledge;
10. 'critical sulphur deposition' means a quantitative estimate of the exposure to oxidised sulphur compounds, taking into account the effects of base cation uptake and base cation deposition, below which significant harmful effects on specified sensitive elements of the environment do not occur, according to present knowledge;
11. 'emission' means the discharge of substances into the atmosphere;
12. 'sulphur emissions' means all emissions of sulphur compounds expressed as kilotonnes of sulphur dioxide (kt SO₂) to the atmosphere originating from anthropogenic sources excluding from ships in international traffic outside territorial waters;
13. 'fuel' means any solid, liquid or gaseous combustible material with the exception of domestic refuse and toxic or dangerous waste;
14. 'stationary combustion source' means any technical apparatus or group of technical apparatus that is co-located on a common site and is or could be discharging waste gases through a common stack, in which fuels are oxidised in order to use the heat generated;
15. 'major new stationary combustion source' means any stationary combustion source the construction or substantial modification of which is authorised after 31 December 1995 and the thermal input of which, when operating at rated capacity, is at least 50 MW_{th}. It is a matter for the competent national

authorities to decide whether a modification is substantial or not, taking into account such factors as the environmental benefits of the modification;

16. 'major existing stationary combustion source' means any existing stationary combustion source the thermal input of which, when operating at rated capacity, is at least 50 MW_{th};
17. 'gas oil' means any petroleum product within HS 2710, or any petroleum product which, by reason of its distillation limits, falls within the category of middle distillates intended for use as fuel and of which at least 85 % by volume, including distillation losses, distils at 350 °C;
18. 'emission limit value' means the permissible concentration of sulphur compounds expressed as sulphur dioxide in the waste gases from a stationary combustion source expressed in terms of mass per volume of the waste gases expressed in mg SO₂/Nm³, assuming an oxygen content by volume in the waste gas of 3 % in the case of liquid and gaseous fuels and 6 % in the case of solid fuels;
19. 'emission limitation' means the permissible total quantity of sulphur compounds expressed as sulphur dioxide discharged from a combustion source or group of combustion sources located either on a common site or within a defined geographical area, expressed in kilotonnes per year;
20. 'desulphurisation rate' means the ratio of the quantity of sulphur which is separated at the combustion source site over a given period to the quantity of sulphur contained in the fuel which is introduced into the combustion source facilities and which is used over the same period;
21. 'sulphur budget' means a matrix of calculated contributions to the deposition of oxidised sulphur compounds in receiving areas, originating from the emissions from specified areas.

Article 2

Basic obligations

1. The Parties shall control and reduce their sulphur emissions in order to protect human health and the environment from adverse effects, in particular acidifying effects, and to ensure, as far as possible, without entailing excessive costs, that depositions of oxidised sulphur compounds in the long term do not exceed critical loads

for sulphur given, in Annex I, as critical sulphur depositions, in accordance with present scientific knowledge.

2. As a first step, the Parties shall, as a minimum, reduce and maintain their annual sulphur emissions in accordance with the timing and levels specified in Annex II.

3. In addition, any Party:

- (a) whose total land area is greater than 2 million square kilometres;
- (b) which has committed itself under paragraph 2 above to a national sulphur emission ceiling no greater than the lesser of its 1990 emissions or its obligation in the 1985 Helsinki Protocol on the reduction of sulphur emissions or their transboundary fluxes by at least 30 %, as indicated in Annex II;
- (c) whose annual sulphur emissions that contribute to acidification in areas under the jurisdiction of one or more other Parties originate only from within areas under its jurisdiction that are listed as SOMAs in Annex III, and has presented documentation to this effect; and
- (d) which has specified upon signature of, or accession to, the present Protocol its intention to act in accordance with this paragraph,

shall, as a minimum, reduce and maintain its annual sulphur emissions in the area so listed in accordance with the timing and levels specified in Annex II.

4. Furthermore, the Parties shall make use of the most effective measures for the reduction of sulphur emissions, appropriate in their particular circumstances, for new and existing sources, which include, *inter alia*:

- measures to increase energy efficiency,
- measures to increase the use of renewable energy,
- measures to reduce the sulphur content of particular fuels and to encourage the use of fuel with a low sulphur content, including the combined use of high-sulphur with low-sulphur or sulphur-free fuel,
- measures to apply best available control technologies not entailing excessive cost,

using the guidance in Annex IV.

5. Each Party, except those Parties subject to the United States/Canada Air Quality Agreement of 1991, shall as a minimum:

- (a) apply emission limit values at least as stringent as those specified in Annex V to all major new stationary combustion sources;
- (b) no later than 1 July 2004 apply, as far as possible without entailing excessive costs, emission limit values at least as stringent as those specified in Annex V to those major existing stationary combustion sources the thermal input of which is above 500 MW_{th} taking into account the remaining lifetime of a plant, calculated from the date of entry into force of the present Protocol, or apply equivalent emission limitations or other appropriate provisions, provided that these achieve the sulphur emission ceilings specified in Annex II and, subsequently, further approach the critical loads as given in Annex I; and no later than 1 July 2004 apply emission limit values or emission limitations to those major existing stationary combustion sources the thermal input of which is between 50 and 500 MW_{th} using Annex V as guidance;
- (c) no later than two years after the date of entry into force of the present Protocol apply national standards for the sulphur content of gas oil at least as stringent as those specified in Annex V. In cases where the supply of gas oil cannot otherwise be ensured, a State may extend the time period given in this subparagraph to a period of up to 10 years. In this case it shall specify, in a declaration to be deposited together with the instrument of ratification, acceptance, approval or accession, its intention to extend the time period.

6. The Parties may, in addition, apply economic instruments to encourage the adoption of cost-effective approaches to the reduction of sulphur emissions.

7. The Parties to this Protocol may, at a session of the executive body, in accordance with rules and conditions which the executive body shall elaborate and adopt, decide whether two or more Parties may jointly implement the obligations set out in Annex II. These rules and conditions shall ensure the fulfilment of the obligations set out in paragraph 2 above and also promote the achievement of the environmental objectives set out in paragraph 1 above.

8. The Parties shall, subject to the outcome of the first review provided for under Article 8 and no later than one year after the completion of that review, commence negotiations on further obligations to reduce emissions.

Article 3

Exchange of technology

1. The Parties shall, consistent with their national laws, regulations and practices, facilitate the exchange of technologies and techniques, including those that increase energy efficiency, the use of renewable energy and the processing of low-sulphur fuels, to reduce sulphur emissions, particularly through the promotion of:

- (a) the commercial exchange of available technology;
- (b) direct industrial contacts and cooperation, including joint ventures;
- (c) the exchange of information and experience;
- (d) the provision of technical assistance.

2. In promoting the activities specified in paragraph 1 above, the Parties shall create favourable conditions by facilitating contacts and cooperation among appropriate organisations and individuals in the private and public sectors that are capable of providing technology, design and engineering services, equipment or finance.

3. The Parties shall, no later than six months after the date of entry into force of the present Protocol, commence consideration of procedures to create more favourable conditions for the exchange of technology to reduce sulphur emissions.

Article 4

National strategies, policies, programmes, measures and information

1. Each Party shall, in order to implement its obligations under Article 2:

- (a) adopt national strategies, policies and programmes, no later than six months after the present Protocol enters into force for it, and
- (b) take and apply national measures,

to control and reduce its sulphur emissions.

2. Each Party shall collect and maintain information on:

- (a) actual levels of sulphur emissions, and of ambient concentrations and depositions of oxidised sulphur and other acidifying compounds, taking into account, for those Parties within the geographical scope of EMEP, the work plan of EMEP; and

- (b) the effects of depositions of oxidised sulphur and other acidifying compounds.

Article 5

Reporting

1. Each Party shall report, through the executive secretary of the Commission, to the executive body, on a periodic basis as determined by the executive body, information on:

- (a) the implementation of national strategies, policies, programmes and measures referred to in Article 4, paragraph 1;
- (b) the levels of national annual sulphur emissions, in accordance with guidelines adopted by the executive body, containing emission data for all relevant source categories; and
- (c) the implementation of other obligations that it has entered into under the present Protocol,

in conformity with a decision regarding format and content to be adopted by the Parties at a session of the executive body. The terms of this decision shall be reviewed as necessary to identify any additional elements regarding the format and/or content of the information that are to be included in the reports.

2. Each Party within the geographical scope of EMEP shall report, through the executive secretary of the Commission, to EMEP, on a periodic basis to be determined by the steering body of EMEP and approved by the Parties at a session of the executive body, information on the levels of sulphur emissions with temporal and spatial resolution as specified by the steering body of EMEP.

3. In good time before each annual session of the executive body, EMEP shall provide information on:

- (a) ambient concentrations and deposition of oxidised sulphur compounds; and
- (b) calculations of sulphur budgets.

Parties in areas outside the geographical scope of EMEP shall make available similar information if requested to do so by the executive body.

4. The executive body shall, in accordance with Article 10, paragraph 2(b), of the Convention, arrange for the preparation of information on the effects of depositions of oxidised sulphur and other acidifying compounds.

5. The Parties shall, at sessions of the executive body, arrange for the preparation, at regular intervals, of

revised information on calculated and internationally optimised allocations of emission reductions for the States within the geographical scope of EMEP, with integrated assessment models, with a view to reducing further, for the purposes of Article 2, paragraph 1, of the present Protocol, the difference between actual depositions of oxidised sulphur compounds and critical load values.

Article 6

Research, development and monitoring

The Parties shall encourage research, development, monitoring and cooperation related to:

- (a) the international harmonisation of methods for the establishment of critical loads and critical levels and the elaboration of procedures for such harmonisation;
- (b) the improvement of monitoring techniques and systems and of the modelling of transport, concentrations and deposition of sulphur compounds;
- (c) strategies for the further reduction of sulphur emissions based on critical loads and critical levels as well as on technical developments, and the improvement of integrated assessment modelling to calculate internationally optimised allocations of emission reductions taking into account an equitable distribution of abatement costs;
- (d) the understanding of the wider effects of sulphur emissions on human health, the environment, in particular acidification, and materials, including historic and cultural monuments, taking into account the relationship between sulphur oxides, nitrogen oxides, ammonia, volatile organic compounds and tropospheric ozone;
- (e) emission abatement technologies, and technologies and techniques to enhance energy efficiency, energy conservation and the use of renewable energy;
- (f) the economic evaluation of benefits for the environment and human health resulting from the reduction of sulphur emissions.

Article 7

Compliance

1. An implementation committee is hereby established to review the implementation of the present Protocol and compliance by the Parties with their obligations. It shall report to the Parties at sessions of the executive body and may make such recommendations to them as it considers appropriate.

2. Upon consideration of a report, and any recommendations, of the implementation committee, the Parties, taking into account the circumstances of a matter and in accordance with Convention practice, may decide upon and call for action to bring about full compliance with the present Protocol, including measures to assist a Party's compliance with the Protocol, and to further the objectives of the Protocol.

3. The Parties shall, at the first session of the executive body after the entry into force of the present Protocol, adopt a decision that sets out the structure and functions of the implementation committee as well as procedures for its review of compliance.

4. The application of the compliance procedure shall be without prejudice to the provisions of Article 9 of the present Protocol.

Article 8

Reviews by the Parties at sessions of the executive body

1. The Parties shall, at sessions of the executive body, pursuant to Article 10, paragraph 2(a), of the Convention, review the information supplied by the Parties and EMEP, the data on the effects of depositions of sulphur and other acidifying compounds and the reports of the implementation committee referred to in Article 7, paragraph 1, of the present Protocol.

2. (a) The Parties shall, at sessions of the executive body, keep under review the obligations set out in the present Protocol, including:

(i) their obligations in relation to their calculated and internationally optimised allocations of emission reductions referred to in Article 5, paragraph 5; and

(ii) the adequacy of the obligations and the progress made towards the achievement of the objectives of the present Protocol.

(b) Reviews shall take into account the best available scientific information on acidification, including assessments of critical loads, technological developments, changing economic conditions and the fulfilment of the obligations on emission levels.

(c) In the context of such reviews, any Party whose obligations on sulphur emission ceilings under Annex II hereto do not conform to the calculated and internationally optimised allocations of emission reductions for that Party, required to

reduce the difference between depositions of sulphur in 1990 and critical sulphur depositions within the geographical scope of EMEP by at least 60 %, shall make every effort to undertake revised obligations.

(d) The procedures, methods and timing for such reviews shall be specified by the Parties at a session of the executive body. The first such review shall be completed in 1997.

Article 9

Settlement of disputes

1. In the event of a dispute between any two or more Parties concerning the interpretation or application of the present Protocol, the Parties concerned shall seek a settlement of the dispute through negotiation or any other peaceful means of their own choice. The parties to the dispute shall inform the executive body of their dispute.

2. When ratifying, accepting, approving or acceding to the present Protocol, or at any time thereafter, a Party which is not a regional economic integration organisation may declare in a written instrument submitted to the depositary that, in respect of any dispute concerning the interpretation or application of the Protocol, it recognises one or both of the following means of dispute settlement as compulsory *ipso facto* and without agreement, in relation to any Party accepting the same obligation:

(a) submission of the dispute to the International Court of Justice;

(b) arbitration in accordance with procedures to be adopted by the Parties at a session of the executive body as soon as practicable, in an annex on arbitration.

A Party which is a regional economic integration organisation may make a declaration with like effect in relation to arbitration in accordance with the procedures referred to in subparagraph (b) above.

3. A declaration made under paragraph 2 above shall remain in force until it expires in accordance with its terms or until three months after written notice of its revocation has been deposited with the depositary.

4. A new declaration, a notice of revocation or the expiry of a declaration shall not in any way affect proceedings pending before the International Court of Justice or the arbitral tribunal, unless the parties to the dispute agree otherwise.

5. Except in a case where the parties to a dispute have accepted the same means of dispute settlement under paragraph 2, if after 12 months following notification by one Party to another that a dispute exists between them, the Parties concerned have not been able to settle their dispute through the means mentioned in paragraph 1 above, the dispute shall be submitted, at the request of any of the parties to the dispute, to conciliation.

6. For the purpose of paragraph 5, a conciliation commission shall be created. The commission shall be composed of an equal number of members appointed by each party concerned or, where parties in conciliation share the same interest, by the group sharing that interest, and a chairman chosen jointly by the members so appointed. The commission shall render a recommendatory award, which the parties shall consider in good faith.

Article 10

Annexes

The Annexes to the present Protocol shall form an integral part of the Protocol. Annexes I and IV are recommendatory in character.

Article 11

Amendments and adjustments

1. Any Party may propose amendments to the present Protocol. Any Party to the Convention may propose an adjustment to Annex II to the present Protocol to add to it its name, together with emission levels, sulphur emission ceilings and percentage emission reductions.

2. Such proposed amendments and adjustments shall be submitted in writing to the executive secretary of the Commission, who shall communicate them to all Parties. The Parties shall discuss the proposed amendments and adjustments at the next session of the executive body, provided that those proposals have been circulated by the executive secretary to the Parties at least 90 days in advance.

3. Amendments to the present Protocol and to its Annexes II, III and V shall be adopted by consensus of the Parties present at a session of the executive body, and shall enter into force for the Parties which have accepted them on the 90th day after the date on which two thirds of the Parties have deposited with the depositary their instruments of acceptance thereof. Amendments shall enter into force for any other Party on the 90th day after the date on which that Party has deposited its instrument of acceptance thereof.

4. Amendments to the Annexes to the present Protocol, other than to the Annexes referred to in paragraph 3 above, shall be adopted by consensus of the Parties present at a session of the executive body. On the expiry of 90 days from the date of its communication by the executive secretary of the Commission, an amendment to any such Annex shall become effective for those Parties which have not submitted to the depositary a notification in accordance with the provisions of paragraph 5 below, provided that at least 16 Parties have not submitted such a notification.

5. Any Party that is unable to approve an amendment to an annex, other than to an annex referred to in paragraph 3 above, shall so notify the depositary in writing within 90 days from the date of the communication of its adoption. The depositary shall without delay notify all Parties of any such notification received. A Party may at any time substitute an acceptance for its previous notification and received. A Party may at any time substitute an acceptance for its previous notification and, upon deposit of an instrument of acceptance with the depositary, the amendment to such an annex shall become effective for that Party.

6. Adjustments to Annex II shall be adopted by consensus of the Parties present at a session of the executive body and shall become effective for all Parties to the present Protocol on the 90th day following the date on which the executive secretary of the Commission notifies those Parties in writing of the adoption of the adjustment.

Article 12

Signature

1. The present Protocol shall be open for signature at Oslo from 13 June 1994 until 14 June 1994 inclusive, then at United Nations headquarters in New York until 12 December 1994 by States members of the Commission as well as States having consultative status with the Commission, pursuant to paragraph 8 of Economic and Social Council Resolution 36(IV) of 28 March 1947, and by regional economic integration organisations, constituted by sovereign States members of the Commission, which have competence in respect of the negotiation, conclusion and application of international agreements in matters covered by the Protocol, provided that the States and organisations concerned are Parties to the Convention and are listed in Annex II.

2. In matters within their competence, such regional economic integration organisations shall, on their own behalf, exercise the rights and fulfil the responsibilities which the present Protocol attributes to their member States. In such cases, the member States of these organisations shall not be entitled to exercise such rights individually.

*Article 13***Ratification, acceptance, approval and accession**

1. The present Protocol shall be subject to ratification, acceptance or approval by signatories.
2. The present Protocol shall be open for accession as from 12 December 1994 by the States and organisations that meet the requirements of Article 12, paragraph 1.

*Article 14***Depositary**

The instruments of ratification, acceptance, approval or accession shall be deposited with the Secretary-General of the United Nations, who will perform the functions of depositary.

*Article 15***Entry into Force**

1. The present Protocol shall enter into force on the 90th day following the date on which the 16th instrument of ratification, acceptance, approval or accession has been deposited with the depositary.

2. For each State and organisation referred to in Article 12, paragraph 1, which ratifies, accepts or approves the present Protocol or accedes thereto after the deposit of the 16th instrument of ratification acceptance, approval or accession, the Protocol shall enter into force on the 90th day following the date of deposit by such Party of its instrument of ratification, acceptance, approval or accession.

*Article 16***Withdrawal**

At any time after five years from the date on which the present Protocol has come into force with respect to a Party, that Party may withdraw from it by giving written notification to the depositary. Any such withdrawal shall take effect on the 90th day following the date of its receipt by the depositary, or on such later date as may be specified in the notification of the withdrawal.

*Article 17***Authentic texts**

The original of the present Protocol, of which the English, French and Russian texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

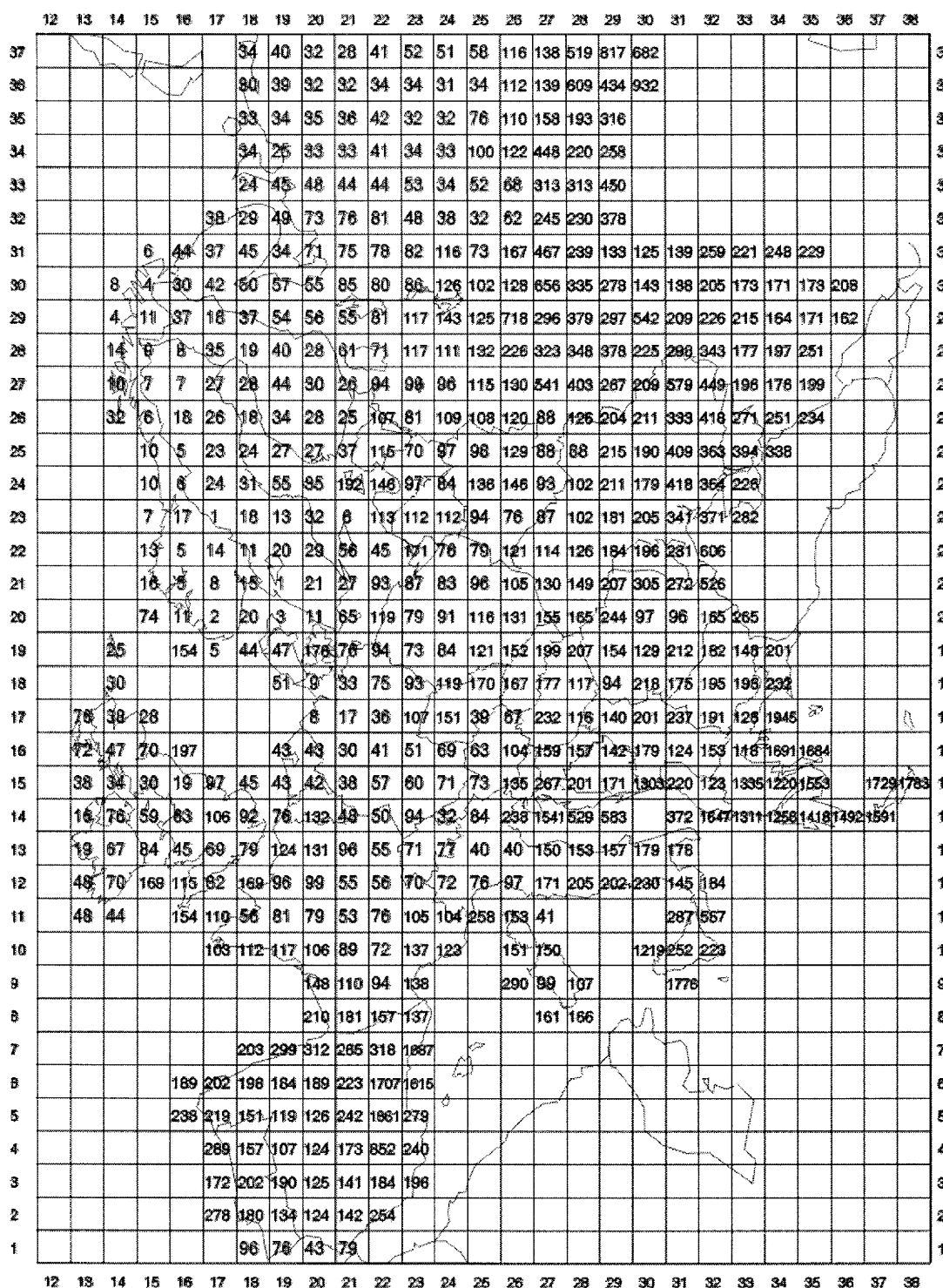
In witness whereof the undersigned, being duly authorised thereto, have signed the present Protocol.

Done at Oslo, this thirteenth day of June one thousand nine hundred and ninety-four.

ANNEX I

CRITICAL SULPHUR DEPOSITION

(5-percentile in centigrams of sulphur per square metre per year)



ANNEX II

SULPHUR EMISSION CEILINGS AND PERCENTAGE EMISSION REDUCTIONS

The sulphur emission ceilings listed in the table below give the obligations referred to in paragraphs 2 and 3 Article 2 of the present Protocol. The 1980 and 1990 emission levels and the percentage emission reductions listed are given for information purposes only.

	Emission levels kt SO ₂ per year		Sulphur emission ceilings ^(a) kt SO ₂ per year			Percentage emission reductions (base year 1980) ^(b)		
	1980	1990	2000	2005	2010	2000	2005	2010
Austria	397	90	78			80		
Belarus	740		456	400	370	38	46	50
Belgium	828	443	248	232	215	70	72	74
Bulgaria	2 050	2 020	1 374	1 230	1 127	33	40	45
Canada — national	4 614	3 700	3 200			30		
— SOMA	3 245		1 750			46		
Croatia	150	160	133	125	117	11	17	22
Czech Republic	2 257	1 876	1 128	902	632	50	60	72
Denmark	451	180	90			80		
Finland	584	260	116			80		
France	3 348	1 202	868	770	737	74	77	78
Germany	7 494	5 803	1 300	990		83	87	
Greece	400	510	595	580	570	0	3	4
Hungary	1 632	1 010	898	816	653	45	50	60
Ireland	222	168	155			30		
Italy	3 800		1 330	1 042		65	73	
Liechtenstein	0,4	0,1	0,1			75		
Luxembourg	24		10			58		
Netherlands	466	207	106			77		
Norway	142	54	34			76		
Poland	4 100	3 210	2 583	2 173	1 397	37	47	66
Portugal	266	284	304	294		0	3	
Russian Federation ^(c)	7 161	4 460	4 440	4 297	4 297	38	40	40
Slovakia	843	539	337	295	240	60	65	72
Slovenia	235	195	130	94	71	45	60	70
Spain	3 319	2 316	2 143			35		
Sweden	507	130	100			80		
Switzerland	126	62	60			52		
Ukraine	3 850		2 310	2 118	1 696	40	45	56
United Kingdom	4 898	3 780	2 449	1 470	980	50	70	80
European Community	25 513		9 598			62		

Notes

^(a) If, in a given year before 2005, a Party finds that, due to a particularly cold winter, a particularly dry summer and an unforeseen short-term loss of capacity in the power supply system, domestically or in a neighbouring country, it cannot comply with its obligations under this Annex, it may fulfil those obligations by averaging its national annual sulphur emissions for the year in question, the year preceding that year and the year following it, provided that the emission level in any single year is not more than 20 % above the sulphur emission ceiling.

The reason for exceedance in any given year and the method by which the three-year average figure will be achieved, shall be reported to the Implementation Committee.

^(b) For Greece and Portugal percentage emission reductions given are based on the sulphur emission ceilings indicated for the year 2000.

^(c) European part within the EMEP area.

*ANNEX III***DESIGNATION OF SULPHUR OXIDES MANAGEMENT AREAS (SOMAs)**

The following SOMA is listed for the purposes of the present Protocol:

South-east Canada SOMA

This is an area of 1 million km² which includes all the territory of the provinces of Prince Edward Island, Nova Scotia and New Brunswick, all the territory of the province of Quebec south of a straight line between Havre-St. Pierre on the north coast of the Gulf of Saint Lawrence and the point where the Quebec-Ontario boundary intersects the James Bay coastline, and all the territory of the province of Ontario south of a straight line between the point where the Ontario-Quebec boundary intersects the James Bay coastline and Nipigon River near the north shore of Lake Superior.

ANNEX IV

CONTROL TECHNOLOGIES FOR SULPHUR EMISSIONS FROM STATIONARY SOURCES

I. INTRODUCTION

1. The aim of this Annex is to provide guidance for identifying sulphur control options and technologies for giving effect to the obligations of the present Protocol.
2. The Annex is based on information on general options for the reduction of sulphur emissions and in particular on emission control technology performance and costs contained in official documentation of the executive body and its subsidiary bodies.
3. Unless otherwise indicated, the reduction measures listed are considered, on the basis of operational experience of several years in most cases, to be the most well-established and economically feasible best available technologies. However, the continuously expanding experience of low-emission measures and technologies at new plants as well as of the retrofitting of existing plants will necessitate regular review of this Annex.
4. Although the Annex lists a number of measures and technologies spanning a wide range of costs and efficiencies, it cannot be considered as an exhaustive statement of control options. Moreover, the choice of control measures and technologies for any particular case will depend on a number of factors, including current legislation and regulatory provisions and, in particular, control technology requirements, primary energy patterns, industrial infrastructure, economic circumstances and specific in-plant conditions.
5. The Annex mainly addresses the control of oxidised sulphur emissions considered as the sum of sulphur dioxide (SO₂) and sulphur trioxide (SO₃), expressed as SO₂. The share of sulphur emitted as either sulphur oxides or other sulphur compounds from non-combustion processes and other sources is small compared to sulphur emissions from combustion.
6. When measures or technologies are planned for sulphur sources emitting other components, in particular nitrogen oxides (N_x), particulates, heavy metals and volatile organic compounds (VOCs), it is worthwhile to consider them in conjunction with pollutant-specific control options in order to maximise the overall abatement effect and minimise the impact on the environment and, especially, to avoid the transfer of air pollution problems to other media (such as waste water and solid waste).

II. MAJOR STATIONARY SOURCES FOR SULPHUR EMISSIONS

7. Fossil fuel combustion processes are the main source of anthropogenic sulphur emissions from stationary sources. In addition, some non-combustion processes may contribute considerably to the emissions: The major stationary source categories, based on EMEP/CORINAIR'90, include:
 - (i) public power, cogeneration and district heating plants:
 - (a) boilers;
 - (b) stationary combustion turbines and internal combustion engines;
 - (ii) commercial, institutional and residential combustion plants:
 - (a) commercial boilers;
 - (b) domestic heaters;

- (iii) industrial combustion plants and processes with combustion:
 - (a) boilers and process heaters;
 - (b) processes, e.g. metallurgical operations such as roasting and sintering, coke oven plants, processing of titanium dioxide (TiO₂), etc.;
 - (c) pulp production;
 - (iv) non-combustion processes, e.g. sulphuric acid production, specific organic synthesis processes, treatment of metallic surfaces;
 - (v) extraction, processing and distribution of fossil fuels;
 - (vi) waste treatment and disposal, e.g. thermal treatment of municipal and industrial waste.
8. Overall data (1990) for the ECE region indicate that about 88 % of total sulphur emissions originate from all combustion processes (20 % from industrial combustion), 5 % from production processes and 7 % from oil refineries. The power plant sector in many countries is the major single contributor to sulphur emissions. In some countries, the industrial sector (including refineries) is also an important SO₂ emitter. Although emissions from refineries in the ECE region are relatively small, their impact on sulphur emissions from other sources is large due to the sulphur in the oil products. Typically 60 % of the sulphur intake present in the crudes remains in the products, 30 % is recovered as elemental sulphur and 10 % is emitted from refinery stacks.

III. GENERAL OPTIONS FOR REDUCTION OF SULPHUR EMISSIONS FROM COMBUSTION

9. General options for reduction of sulphur emissions are:

(i) **Energy management measures** ⁽¹⁾

(a) *Energy saving*

The rational use of energy (improved energy efficiency/process operation, cogeneration and/or demand-side management) usually results in a reduction in sulphur emissions.

(b) *Energy mix*

In general, sulphur emissions can be reduced by increasing the proportion of non-combustion energy sources (i.e. hydro, nuclear, wind, etc.) to the energy mix. However, further environmental impacts have to be considered.

(ii) **Technological options**

(a) *Fuel switching*

The SO₂ emissions during combustion are directly related to the sulphur content of the fuel used.

Fuel switching (e.g. from high- to low-sulphur coals and/or liquid fuels, or from coal to gas) leads to lower sulphur emissions, but there may be certain restrictions, such as the availability of low-sulphur fuels and the adaptability of existing combustion systems to different fuels. In many ECE countries, some coal or oil combustion plants are being replaced by gas-fired combustion plants. Dual-fuel plants may facilitate fuel switching.

⁽¹⁾ Options (i), (a) and (b) are integrated in the energy structure and policy of a Party. Implementation status, efficiency and costs per sector are not considered here.

(b) *Fuel cleaning*

Cleaning of natural gas is state-of-the-art technology and widely applied for operational reasons.

Cleaning of process gas (acid refinery gas, coke oven gas, biogas, etc.) is also state-of-the-art technology.

Desulphurisation of liquid fuels (light and middle fractions) is state-of-the-art technology.

Desulphurisation of heavy fractions is technically feasible; nevertheless, the crude properties should be kept in mind. Desulphurisation of atmospheric residue (bottom products from atmospheric crude distillation units) for the production of low-sulphur fuel oil is not, however, commonly practised; processing low-sulphur crude is usually preferable. Hydro-cracking and full conversion technology have matured and combine high sulphur retention with improved yield of light products. The number of full conversion refineries is as yet limited. Such refineries typically recover 80 to 90 % of the sulphur intake and convert all residues into light products or other marketable products. For this type of refinery, energy consumption and investment costs are increased. Typical sulphur content for refinery products is given in Table 1 below.

Table 1

Sulphur content from refinery products

[Sulphur content (%)]

	Typical present values	Anticipated future values
Gasoline	0,1	0,05
Jet kerosene	0,1	0,01
Diesel	0,05-0,3	< 0,05
Heating oil	0,1-0,2	< 0,1
Fuel oil	0,2-3,5	< 1
Marine diesel	0,5-1,0	< 0,5
Bunker oil	3,0-5,0	< 1 (coastal areas) < 2 (high seas)

Current technologies to clean hard coal can remove approximately 50 % of the inorganic sulphur (depending on coal properties) but none of the organic sulphur. More effective technologies are being developed which, however, involve higher specific investment and costs. Thus the efficiency of sulphur removal by coal cleaning is limited compared to flue gas desulphurisation. There may be a country-specific optimisation potential for the best combination of fuel cleaning and flue gas cleaning.

(c) *Advanced combustion technologies*

These combustion technologies with improved thermal efficiency and reduced sulphur emissions include: fluidised-bed combustion (FBC): bubbling (BFBC), circulating (CFBC) and pressurised (PFBC); integrated gasification combined-cycle (IGCC); and combined-cycle gas turbines (CCGT).

Stationary combustion turbines can be integrated into combustion systems in existing conventional power plants which can increase overall efficiency by 5 to 7 %, leading, for example, to a significant reduction SO₂ emissions. However, major alterations to the existing furnace system become necessary.

Fluidised-bed combustion is a combustion technology for burning hard coal and brown coal, but it can also burn other solid fuels such as petroleum coke and low-grade fuels such as waste, peat and wood. Emissions can additionally be reduced by integrated combustion control in the system due to the addition of lime/limestone to the bed material. The total installed capacity of FBC has reached approximately 30 000 MW_{th} (250 to 350 plants), including 8 000 MW_{th} in the capacity range of greater than 50 MW_{th}. By-products from this process may cause problems with respect to use and/or disposal, and further development is required.

The IGCC process includes coal gasification and combined-cycle power generation in a gas and steam turbine. The gasified coal is burnt in the combustion chamber of the gas turbine. Sulphur emission control is achieved by the use of state-of-the-art technology for raw gas cleaning facilities upstream of the gas turbine. The technology also exists for heavy oil residues and bitumen emulsions. The installed capacity is presently about 1 000 MW_{el} (5 plants).

Combined-cycle gas-turbine power stations using natural gas as fuel with an energy efficiency of approximately 48 to 52 % are currently being planned.

(d) *Process and combustion modifications*

Combustion modifications comparable to the measures used for NO_x emission control do not exist, as during combustion the organically and/or inorganically bound sulphur is almost completely oxidised (a certain percentage depending on the fuel properties and combustion technology is retained in the ash).

In this Annex dry additive processes for conventional boilers are considered as process modifications due to the injection of an agent into the combustion unit. However, experience has shown that, when applying these processes, thermal capacity is lowered, the Ca/S ratio is high and sulphur removal low. Problems with the further utilisation of the by-product have to be considered, so that this solution should usually be applied as an intermediate measure and for smaller units (Table 2).

Table 2

Emissions of sulphur oxides obtained from the application of technological options to fossil-fuelled boilers

	Uncontrolled emissions		Additive injection		Wet scrubbing ^(a)		Spray dry absorption ^(b)	
Reduction efficiency (%)			up to 60		95		up to 90	
Energy efficiency (kW _{el} /10 ³ m ³ /h)			0,1-1		6-10		3-6	
Total installed capacity (ECE Eur) (MW _{th})					194 000		16 000	
Type of by-product			Mix of Ca salts and fly ashes		Gypsum (sludge/waste water)		Mix of CaSO ₃ x 1/2 H ₂ O and fly ashes	
Specific investment (cost ECU (1990)/kW _{el})			20-50		60-250		50-220	
	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}
Hard coal ^(d)	1 000-10 000	3,5-35	400-4 000	1,4-14	< 400 (< 200, 1 % S)	< 1,4 < 0,7	< 400 (< 200, 1 % S)	< 1,4 < 0,7
Brown coal ^(d)	1 000-20 000	4,2-84	400-8 000	1,7-33,6	< 400 (< 200, 1 % S)	< 1,7 < 0,8	< 400 (< 200, 1 % S)	< 1,7 < 0,8
Heavy oil ^(d)	1 000-10 000	2,8-28	400-4 000	1,1-11	< 400 (< 200, 1 % S)	< 1,1 < 0,6	< 400 (< 200, 1 % S)	< 1,1 < 0,6

	Ammonia scrubbing ^(b)		Wellman Lord ^(a)		Activated carbon ^(a)		Combined catalytic ^(a)	
Reduction efficiency (%)	up to 90		95		95		95	
Energy efficiency (kW _{el} /10 ³ m ³ /h)	3-10		10-15		4-8		2	
Total installed capacity (ECE Eur) (MW _{th})	200		2 000		700		1 300	
Type of by-product	Ammonia fertiliser		Elemental S Sulphuric acid (99 vol. %)		Elemental S Sulphuric acid (99 vol. %)		Sulphuric acid (70 wt. %)	
Specific investment (cost ECU (1990)/kW _{el})	230-270 ^(c)		200-300 ^(c)		280-320 ^(c) ^(f)		320-350 ^(c) ^(f)	
	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}	mg/m ³ ^(c)	g/kWh _{el}
Hard coal ^(d)	< 400 (< 200, 1 % S)	< 1,4 < 0,7	< 400 (< 200, 1 % S)	< 1,4 < 0,7	< 400 (< 200, 1 % S)	< 1,4 < 0,7	< 400 (< 200, 1 % S)	< 1,4 < 0,7
Brown coal ^(d)	< 400 (< 200, 1 % S)	< 1,7 < 0,8	< 400 (< 200, 1 % S)	< 1,7 < 0,8	< 400 (< 200, 1 % S)	< 1,7 < 0,8	< 400 (< 200, 1 % S)	< 1,7 < 0,8
Heavy oil ^(d)	< 400 (< 200, 1 % S)	< 1,1 < 0,6	< 400 (< 200, 1 % S)	< 1,1 < 0,6	< 400 (< 200, 1 % S)	< 1,1 < 0,6	< 400 (< 200, 1 % S)	< 1,1 < 0,6

^(a) For high sulphur content in the fuel the removal efficiency has to be adapted. However, the scope for doing so may be process-specific. Availability of these processes is usually 95 %.

^(b) Liquid applicability for high-sulphur fuels.

^(c) Emission in mg/m³ (STP), dry, 6 % oxygen for solid fuels, 3 % oxygen for liquid fuels.

^(d) Conversion factor depends on fuel properties, specific fuel gas volume and thermal efficiency of boiler (conversion factors (m³/kWh_{el}, thermal efficiency: 36 %) used: hard coal: 3,50; brown coal: 4,20; heavy oil: 2,80).

^(e) Specific investment cost relates to a small sample of installations.

^(f) Specific investment cost includes denitrification process.

The table was established mainly for large combustion installations in the public sector. However, the control options are also valid for other sectors with similar exhaust gases.

(e) Flue gas desulphurisation (FGD) processes

These processes aim at removing already formed sulphur oxides, and are also referred to as secondary measures. The state-of-the-art technologies for flue gas treatment processes are all based on the removal of sulphur by wet, dry or semi-dry and catalytic chemical processes.

To achieve the most efficient programme for sulphur emission reductions beyond the energy management measures listed in (i) above a combination of technological options identified in (ii) above should be considered.

In some cases options for reducing sulphur emissions may also result in the reduction of emissions of CO₂, NO_x and other pollutants.

In public power, cogeneration and district heating plants, flue gas treatment processes used include: lime/limestone wet scrubbing (LWS); spray dry absorption (SDA); Wellman Lord process (WL); ammonia scrubbing (AS); and combined NO_x/SO_x removal processes (activated carbon process (AC) and combined catalytic NO_x/SO_x removal).

In the power generation sector, LWS and SDA cover 85 % and 10 %, respectively, of the installed FGD capacity.

Several new flue gas desulphurisation processes, such as electron beam dry scrubbing (EBDS) and Mark 13A, have not yet passed the pilot stage.

Table 2 above shows the efficiency of the abovementioned secondary measures based on the practical experience gathered from a large number of implemented plants. The implemented capacity as well as the capacity range are also mentioned. Despite comparable characteristics for several sulphur abatement technologies, local or plant-specific influences may lead to the exclusion of a given technology.

Table 2 also includes the usual investment cost ranges for the sulphur abatement technologies listed in sections (ii)(c), (d) and (e). However, when applying these technologies to individual cases it should be noted that investment costs of emission reduction measures will depend amongst other things on the particular technologies used, the required control systems, the plant size, the extent of the required reduction and the timescale of planned maintenance cycles. The table thus gives only a board range of investment costs. Investment costs for retrofit generally exceed those for new plants.

IV. CONTROL TECHNIQUES FOR OTHER SECTORS

10. The control techniques listed in section 9(ii)(a) to (e) are valid not only in the power plant sector but also in various other sectors of industry. Several years of operational experience have been acquired, in most cases in the power plant sector.
11. The application of sulphur abatement technologies in the industrial sector merely depends on the process' specific limitations in the relevant sectors. Important contributors to sulphur emission and corresponding reduction measures are presented in Table 3 below.

Table 3

Source	Reduction measures
Roasting of non-ferrous sulphides	Wet sulphuric acid catalytic process (WSA)
Viscose production	Double-contact process
Sulphuric acid production	Double-contact process, improved yield
Kraft pulp production	Variety of process integrated measures

12. In the sectors listed in Table 3, process-integrated measures, including raw material changes (if necessary combined with sector-specific flue gas treatment), can be used to achieve the most effective reduction of sulphur emissions.
13. Reported examples are the following:
 - (a) in new kraft pulp mills, sulphur emission of less than 1 kg of sulphur per tonne of pulp AD (air dried) can be achieved ⁽¹⁾;
 - (b) in sulphite pulp mills, 1 to 1,5 kg of sulphur per tonne of pulp AD can be achieved;
 - (c) in the case of roasting of sulphides, removal efficiencies of 80 to 99 % for 10 000 to 200 000 m³/h units have been reported (depending on the process);
 - (d) for one iron or sintering plant, an FGD unit of 320 000 m³/h capacity achieves a clean gas value below 100 mg SO_x/Nm³ at 6 % O₂;
 - (e) coke ovens are achieving less than 400 mg SO_x/Nm³ at 6 % O₂;

⁽¹⁾ Control of sulphur-to-sodium ratio is required, i.e. removal of sulphur in the form of neutral salts and use of sulphur-free sodium make-up.

- (f) sulphuric acid plants achieve a conversion rate larger than 99 %;
- (g) advanced Claus plant achieves sulphur recovery of more than 99 %.

V. BY-PRODUCTS AND SIDE-EFFECTS

14. As efforts to reduce sulphur emissions from stationary sources are increased in the countries of the ECE region, the quantities of by-products will also increase.
15. Options which would lead to usable by-products should be selected. Furthermore, options that lead to increased thermal efficiency and minimise the waste disposal issue whenever possible should be selected. Although most by-products are usable or recyclable products such as gypsum, ammonia salts, sulphuric acid or sulphur, factors such as market conditions and quality standards need to be taken into account. Further utilisation of FBC and SDA by-products have to be improved and investigated, as disposal sites and disposal criteria limit disposal in several countries.
16. The following side-effects will not prevent the implementation of any technology or method but should be considered when several sulphur abatement options are possible:
 - (a) energy requirements of the gas treatment processes;
 - (b) corrosion attack due to the formation of sulphuric acid by the reaction of sulphur oxides with water vapour;
 - (c) increased use of water and waste water treatment;
 - (d) reagent requirements;
 - (e) solid waste disposal.

VI. MONITORING AND REPORTING

17. The measures taken to carry out national strategies and policies for the abatement of air pollution include: legislation and regulatory provisions, economic incentives and disincentives; as well as technological requirements (best available technology).
18. In general, standards are set, per emission source, according to plant size, operating mode, combustion technology, fuel type and whether it is a new or existing plant. An alternative approach also used is to set a target for the reduction of total sulphur emissions from a group of sources and to allow a choice of where to take action to reach this target (the bubble concept).
19. Efforts to limit the sulphur emissions to the levels set out in the national framework legislation have to be controlled by a permanent monitoring and reporting system and reported to the supervising authorities.
20. Several monitoring systems, using both continuous and is continuous measurement methods, are available. However, quality requirements vary. Measurements are to be carried out by qualified institutes using measuring and monitoring systems. To this end, a certification system can provide the best assurance.
21. In the framework of modern automated monitoring systems and process control equipment, reporting does not create a problem. The collection of data for further use is a state-of-the-art technique; however, data to be reported to competent authorities differ from case to case. To obtain better comparability, data sets and prescribing regulations should be harmonised. Harmonisation is also desirable for quality assurance of measuring and monitoring systems. This should be taken into account when comparing data.

22. To avoid discrepancies and inconsistencies, key issues and parameters, including the following, must be well defined:
- (a) definition of standards expressed as ppmv, mg/Nm³, g/GJ, kg/h or kg/tonne of product. Most of these units need to be calculated and need specification in terms of gas temperature, humidity, pressure, oxygen content or heat input value;
 - (b) definition of period over which standards are to be averaged, expressed as hours, months or a year;
 - (c) definition of failure times and corresponding emergency regulations regarding by pass of monitoring systems or shut-down of the installation;
 - (d) definition of methods for back-filling of data missed or lost as a result of equipment failure;
 - (e) definition of the parameter set to be measured. Depending on the type of industrial process, the necessary information may differ. This also involves the location of the measurement point within the system.
23. Quality control of measurements has to be ensured.
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ANNEX V

EMISSION AND SULPHUR CONTENT LIMIT VALUES

A. Emission limit values for major stationary combustion sources ^(a)

	(i) (MW _{th})	(ii) Emission limit value (mg SO ₂ /Nm ³) ^(b)	(iii) Desulphurisation rate (%)
1. SOLID FUELS (based on 6 % oxygen in flue gas)	50-100	2 000	
	100-500	2 000-400 (linear decrease)	40 (for 100-167 MW _{th}) 40-90 (linear increase for 167-500 MW _{th})
	> 500	400	90
2. LIQUID FUELS (based on 3 % oxygen in flue gas)	50-300	1 700	
	300-500	1 700-400 (linear decrease)	90
	> 500	400	90
3. GASEOUS FUELS (based on 3 % oxygen in flue gas)			
Gaseous fuels in general		35	
Liquefied gas		5	
Low calorific gases from gasification of refinery residues, coke oven gas, blast-furnace gas		800	

B. Gas oil

	Sulphur content (%)
Diesel for on-road vehicles	0,05
Other types	0,2

Notes

- (^a) As guidance, for a plant with a multi-fuel firing unit involving the simultaneous use of two or more types of fuels, the competent authorities shall set emission limit values taking into account the emission limit values from column (ii) relevant for each individual fuel, the rate of thermal input delivered by each fuel and, for refineries, the relevant specific characteristics of the plant. For refineries, such a combined limit value shall under no circumstances exceed 1 700 mg SO₂/Nm³.

In particular, the limit values shall not apply to the following plants:

- plants in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials, e.g. reheating furnaces, furnaces for heat treatment,
- post-combustion plants, i.e. any technical apparatus designed to purify the waste gases by combustion which is not operated as an independent combustion plant,
- facilities for the regeneration of catalytic cracking catalysts,
- facilities for the conversion of hydrogen sulphide into sulphur,
- reactors used in the chemical industry,
- coke battery furnaces,
- cowpers,
- waste incinerators,
- plants powered by diesel, petrol and gas engines or by gas turbines, irrespective of the fuel used.

In a case where a Party, due to the high sulphur content of indigenous solid or liquid fuels, cannot meet the emission limit values set forth in column (ii), it may apply the desulphurisation rates set forth in column (iii) or a maximum limit value of 800 mg SO₂/Nm³ (although preferably not more than 650 mg SO₂/Nm³). The Party shall report any such application to the implementation committee in the calendar year in which it is made.

Where two or more separate new plants are installed in such a way that, taking technical and economic factors into account, their waste gases could, in the judgement of the competent authorities, be discharged through a common stack, the combination formed by such plants is to be regarded as a single unit.

- (^b) mg SO₂/Nm³ is defined at a temperature of 273 °K and a pressure of 101,3 kPa, after correction for the water vapour content.
-