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Economic Commission for Europe

Executive Body for the Convention on Long-range
Transboundary Air Pollution

1998 Protocol on Heavy Metals, as amended on 13 December 2012

Summary

On 13 December 2012 the Parties to the 1998 Protocol on Heavy Metals to the Convention on Long-range Transboundary Air Pollution, meeting within the thirty-first session of the Executive Body for the Convention, adopted two decisions to amend the Protocol and its annexes, as follows (see ECE/EB.AIR/113/Add.1):

- (a) Decision 2012/5 on amendment of the text of and annexes other than III and VII to the 1998 Protocol on Heavy Metals;
- (b) Decision 2012/6 on amendment of annex III to the 1998 Protocol on Heavy Metals.

The Executive Body invited the secretariat to deposit the adopted amendments to the Protocol on Heavy Metals with the Secretary-General of the United Nations by forwarding them to the Treaty Section of the United Nations Office of Legal Affairs (ECE/EB.AIR/113, para. 17 (a)). The amendments were communicated to Parties on 11 October 2013 (C.N.709.2013.TREATIES-XXVII.1.1 and C.N.711.2013.TREATIES-XXVII.1.f), and the Treaty Section invited Parties to deposit their instruments of acceptance for the entry into force of the amendments. The amendments to annex III to the Protocol entered into force on 9 January 2014 in accordance with article 13, paragraph 4, of the Protocol. In line with article 13, paragraph 3, of the Protocol, the amendments to the text of the Protocol and its annexes other than III and VII require ratifications by two thirds of the Parties.

The Executive Body further mandated the secretariat to produce and translate into all three official languages of the United Nations Economic Commission for Europe a consolidated text of the 1998 Protocol on Heavy Metals with its annexes, on the basis of the decisions on amendments to the Protocol adopted at the thirty-first session (ECE/EB.AIR/113, para. 17 (b)). The present document responds to that request. It has been compiled by the secretariat and is not a certified true copy of the Protocol. It contains minor editorial changes. In case of any discrepancy between the consolidated text and the amendments contained in the document ECE/EB.AIR/113/Add.1, the latter document prevails.

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The Parties,

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

Concerned that emissions of certain heavy metals are transported across national boundaries and may cause damage to ecosystems of environmental and economic importance and may have harmful effects on human health,

Considering that combustion and industrial processes are the predominant anthropogenic sources of emissions of heavy metals into the atmosphere,

Acknowledging that heavy metals are natural constituents of the Earth's crust and that many heavy metals in certain forms and appropriate concentrations are essential to life,

Taking into consideration existing scientific and technical data on the emissions, geochemical processes, atmospheric transport and effects on human health and the environment of heavy metals, as well as on abatement techniques and costs,

Aware that techniques and management practices are available to reduce air pollution caused by the emissions of heavy metals,

Recognizing that countries in the region of the United Nations Economic Commission for Europe (ECE) have different economic conditions, and that in certain countries the economies are in transition,

Resolved to take measures to anticipate, prevent or minimize emissions of certain heavy metals and their related compounds, taking into account the application of the precautionary approach, as set forth in principle 15 of the Rio Declaration on Environment and Development,

Reaffirming that 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 and development 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,

Mindful that measures to control emissions of heavy metals would also contribute to the protection of the environment and human health in areas outside the ECE region, including the Arctic and international waters,

Noting that abating the emissions of specific heavy metals may provide additional benefits for the abatement of emissions of other pollutants,

Aware that further and more effective action to control and reduce emissions of certain heavy metals may be needed and that, for example, effects-based studies may provide a basis for further action,

Noting the important contribution of the private and non-governmental sectors to knowledge of the effects associated with heavy metals, available alternatives and abatement techniques, and their role in assisting in the reduction of emissions of heavy metals,

Bearing in mind the activities related to the control of heavy metals at the national level and in international forums,

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 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. “Heavy metals” means those metals or, in some cases, metalloids which are stable and have a density greater than 4.5 g/cm^3 and their compounds;
8. “Emission” means a release from a point or diffuse source into the atmosphere;
9. “Stationary source” means any fixed building, structure, facility, installation, or equipment that emits or may emit a heavy metal listed in annex I directly or indirectly into the atmosphere;
10. “New stationary source” means any stationary source of which the construction or substantial modification is commenced after the expiry of two years from the date of entry into force for a Party of the present Protocol. A Party may decide not to treat as a new stationary source any stationary source for which approval has already been given by the appropriate competent national authority at the time of entry into force of the Protocol for that Party and provided that the construction or substantial modification is commenced within five years of that date. It shall be 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.
11. “Major stationary source category” means any stationary source category that is listed in annex II and that contributes at least 1 per cent to a Party’s total emissions from stationary sources of a heavy metal listed in annex I for the reference year specified in accordance with annex I.
12. The terms “this Protocol”, “the Protocol” and “the present Protocol” mean the 1998 Protocol on Heavy Metals, as amended from time to time.

Article 2 Objective

The objective of the present Protocol is to control emissions of heavy metals caused by anthropogenic activities that are subject to long-range transboundary atmospheric transport and are likely to have significant adverse effects on human health or the environment, in accordance with the provisions of the following articles.

Article 3 Basic obligations

1. Each Party shall reduce its total annual emissions into the atmosphere of each of the heavy metals listed in annex I from the level of the emission in the reference year set in accordance with that annex by taking effective measures, appropriate to its particular circumstances.

2. Subject to paragraphs 2 bis and 2 ter, each Party shall, no later than the timescales specified in annex IV, apply:

(a) The best available techniques, taking into consideration annex III, to each new stationary source within a major stationary source category for which guidance adopted by the Parties at a session of the Executive Body identifies best available techniques;

(b) The limit values specified in annex V to each new stationary source within a major stationary source category. A Party may, as an alternative, apply different emission reduction strategies that achieve equivalent overall emission levels;

(c) The best available techniques, taking into consideration annex III, to each existing stationary source within a major stationary source category for which guidance adopted by the Parties at a session of the Executive Body identifies best available techniques. A Party may, as an alternative, apply different emission reduction strategies that achieve equivalent overall emission reductions;

(d) The limit values specified in annex V to each existing stationary source within a major stationary source category, insofar as this is technically and economically feasible. A Party may, as an alternative, apply different emission reduction strategies that achieve equivalent overall emission reductions.

2 bis. A Party that was already a Party to the present Protocol prior to the entry into force of an amendment that introduces new source categories may apply the limit values applicable to an “existing stationary source” to any source in such a new category the construction or substantial modification of which is commenced before the expiry of two years from the date of entry into force of that amendment for that Party, unless and until that source later undergoes substantial modification.

2 ter. A Party that was already a Party to the present Protocol prior to the entry into force of an amendment that introduces new limit values applicable to a “new stationary source” may continue to apply the previously applicable limit values to any source the construction or substantial modification of which is commenced before the expiry of two years from the date of entry into force of that amendment for that Party, unless and until that source later undergoes substantial modification.

3. Each Party shall apply product control measures in accordance with the conditions and timescales specified in annex VI.

4. Each Party should consider applying additional product management measures, taking into consideration annex VII.
5. Each Party shall develop and maintain emission inventories for the heavy metals listed in annex I. Parties within the geographical scope of EMEP shall use the methodologies specified in guidelines prepared by the Steering Body of EMEP and adopted by the Parties at a session of the Executive Body. Parties in areas outside the geographical scope of EMEP shall use as guidance the methodologies developed through the workplan of the Executive Body.
6. A Party that, after applying paragraphs 2 and 3 above, cannot achieve the requirements of paragraph 1 above for a heavy metal listed in annex I, shall be exempted from its obligations in paragraph 1 above for that heavy metal.
7. Any Party whose total land area is greater than 6,000,000 km² shall be exempted from its obligations in paragraphs 2 (b), (c), and (d) above, if it can demonstrate that, no later than eight years after the date of entry into force of the present Protocol, it will have reduced its total annual emissions of each of the heavy metals listed in annex I from the source categories specified in annex II by at least 50 per cent from the level of emissions from these categories in the reference year specified in accordance with annex I. A Party that intends to act in accordance with this paragraph shall so specify upon signature of, or accession to, the present Protocol.
8. Each Party should actively participate in programmes under the Convention on the effects of air pollution on human health and the environment and programmes on atmospheric monitoring and modelling.

Article 3 bis

Flexible transitional arrangements

1. Notwithstanding article 3, paragraphs 2 (c) and 2 (d), a Party to the Convention that becomes a Party to the present Protocol between 1 January 2014 and 31 December 2019 may apply flexible transitional arrangements for the implementation of best available techniques and limit values to existing stationary sources in specific stationary source categories under the conditions specified in this article.
2. Any Party electing to apply the flexible transitional arrangements under this article shall indicate in its instrument of ratification, acceptance, approval or accession to the present Protocol the following:
 - (a) The specific stationary source categories listed in annex II for which the Party is electing to apply flexible transitional arrangements, provided that no more than four such categories may be listed;
 - (b) Stationary sources for which construction or the last substantial modification commenced prior to 1990 or an alternative year of the period 1985–1995 inclusive, specified by a Party upon ratification, acceptance, approval or accession, which are eligible for flexible transitional arrangements as set out in paragraph 5; and
 - (c) An implementation plan consistent with paragraphs 3 and 4 identifying a timetable for full implementation of the specified provisions.
3. A Party shall, as a minimum, apply best available techniques for existing stationary sources in categories 1, 2, 5 and 7 of annex II no later than eight years after the entry into force of the present Protocol for the Party, or 31 December 2022, whichever is sooner, except as provided in paragraph 5.

4. In no case may a Party's application of best available techniques or limit values for any existing stationary sources be postponed past 31 December 2030.

5. With respect to any source or sources indicated pursuant to paragraph 2 (b), a Party may decide, no later than eight years after entry into force of the present Protocol for the Party, or 31 December 2022, whichever is sooner, that such source or sources will be closed down. A list of such sources shall be provided as part of the Party's next report pursuant to paragraph 6. Requirements for application of best available techniques and limit values will not apply to any such source or sources, provided the source or sources are closed down no later than 31 December 2030. For any such source or sources not closed down as of that date, a Party must thereafter apply the best available techniques and limit values applicable to new sources in the applicable source category.

6. A Party electing to apply the flexible transitional arrangements under this article shall provide the Executive Secretary of the Commission with triennial reports of its progress towards implementation of best available techniques and limit values to the stationary sources in the stationary source categories identified pursuant to this article. The Executive Secretary of the Commission will make such triennial reports available to the Executive Body.

Article 4

Exchange of information and technology

1. The Parties shall, in a manner consistent with their laws, regulations and practices, facilitate the exchange of technologies and techniques designed to reduce emissions of heavy metals, including but not limited to exchanges that encourage the development of product management measures and the application of best available techniques, in particular by promoting:

- (a) The commercial exchange of available technology;
- (b) Direct industrial contacts and cooperation, including joint ventures;
- (c) The exchange of information and experience; and
- (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 organizations and individuals in the private and public sectors that are capable of providing technology, design and engineering services, equipment or finance.

Article 5

Strategies, policies, programmes and measures

1. Each Party shall develop, without undue delay, strategies, policies and programmes to discharge its obligations under the present Protocol.

2. A Party may, in addition:

- (a) Apply economic instruments to encourage the adoption of cost-effective approaches to the reduction of heavy metal emissions;
- (b) Develop government/industry covenants and voluntary agreements;
- (c) Encourage the more efficient use of resources and raw materials;

- (d) Encourage the use of less polluting energy sources;
 - (e) Take measures to develop and introduce less polluting transport systems;
 - (f) Take measures to phase out certain heavy metal emitting processes where substitute processes are available on an industrial scale;
 - (g) Take measures to develop and employ cleaner processes for the prevention and control of pollution.
3. The Parties may take more stringent measures than those required by the present Protocol.

Article 6

Research, development and monitoring

The Parties shall encourage research, development, monitoring and cooperation, primarily focusing on the heavy metals listed in annex I, related, but not limited, to:

- (a) Emissions, long-range transport and deposition levels and their modelling, existing levels in the biotic and abiotic environment, the formulation of procedures for harmonizing relevant methodologies;
- (b) Pollutant pathways and inventories in representative ecosystems;
- (c) Relevant effects on human health and the environment, including quantification of those effects;
- (d) Best available techniques and practices and emission control techniques currently employed by the Parties or under development;
- (e) Collection, recycling and, if necessary, disposal of products or wastes containing one or more heavy metals;
- (f) Methodologies permitting consideration of socioeconomic factors in the evaluation of alternative control strategies;
- (g) An effects-based approach which integrates appropriate information, including information obtained under subparagraphs (a) to (f) above, on measured or modelled environmental levels, pathways, and effects on human health and the environment, for the purpose of formulating future optimized control strategies which also take into account economic and technological factors;
- (h) Alternatives to the use of heavy metals in products listed in annexes VI and VII;
- (i) Gathering information on the levels of heavy metals in certain products, on the potential for emissions of those metals to occur during the manufacture, processing, distribution in commerce, use and disposal of the product, and on techniques to reduce such emissions.

Article 7

Reporting

1. Subject to its laws governing the confidentiality of commercial information:
- (a) Each Party shall report, through the Executive Secretary of the Commission, to the Executive Body, on a periodic basis as determined by the Parties meeting within the

Executive Body, information on the measures that it has taken to implement the present Protocol. Moreover:

(i) Where a Party applies different emission reduction strategies under article 3 paragraphs 2 (b), (c) or (d), it shall document the strategies applied and its compliance with the requirements of those paragraphs;

(ii) Where a Party judges the application of certain limit values, as specified in accordance with article 3 paragraph 2 (d), not to be technically and economically feasible, it shall report and justify this;

(b) Each Party within the geographical scope of EMEP shall report to EMEP, through the Executive Secretary of the Commission, information on the levels of emissions of heavy metals listed in annex I, using the methodologies specified in guidelines prepared by the Steering Body of EMEP and adopted by the Parties at a session of the Executive Body. Parties in areas outside the geographical scope of EMEP shall report available information on levels of emissions of the heavy metals listed in annex I. Each Party shall also provide information on the levels of emissions of the substances listed in annex I for the reference year specified in that annex;

(c) Each Party within the geographical scope of EMEP should report available information to the Executive Body, through the Executive Secretary of the Commission, on its air pollution effects programmes on human health and the environment and atmospheric monitoring and modelling programmes under the Convention using guidelines adopted by the Executive Body;

(d) Parties in areas outside the geographical scope of EMEP should make available information similar to that specified in subparagraph (c), if requested to do so by the Executive Body.

2. The information to be reported in accordance with paragraph 1 (a) above shall be 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 or the content of the information that is to be included in the reports.

3. Upon the request of and in accordance with timescales decided by the Executive Body, EMEP and other subsidiary bodies shall provide relevant information on the long-range transport and deposition of heavy metals.

Article 8

Calculations

Upon the request of and in accordance with timescales decided by the Executive Body, EMEP and its technical bodies and centres shall, using appropriate models and measurements, provide to the Executive Body calculations of transboundary fluxes and depositions of heavy metals within the geographical scope of EMEP. In areas outside the geographical scope of EMEP, models appropriate to the particular circumstances of Parties to the Convention shall be used.

Article 9

Compliance

Compliance by each Party with its obligations under the present Protocol shall be reviewed regularly. The Implementation Committee established by decision 1997/2 of the Executive

Body as its fifteenth session shall carry out such reviews and report to the Parties meeting within the Executive Body in accordance with the terms of the annex to that decision, including any amendments thereto.

Article 10

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, EMEP and other subsidiary bodies and the reports of the Implementation Committee referred to in article 9 of the present Protocol.
2. The Parties shall, at sessions of the Executive Body, keep under review the progress made towards meeting the obligations set out in the present Protocol.
3. The Parties shall, at sessions of the Executive Body, review the sufficiency and effectiveness of the obligations set out in the present Protocol:
 - (a) Such reviews will take into account the best available scientific information on the effects of the deposition of heavy metals, assessments of technological developments, and changing economic conditions;
 - (b) Such reviews will, in the light of the research, development, monitoring and cooperation undertaken under the present Protocol:
 - (i) Evaluate progress towards meeting the objective of the present Protocol;
 - (ii) Evaluate whether additional emission reductions beyond the levels required by this Protocol are warranted to reduce further the adverse effects on human health or the environment; and
 - (iii) Take into account the extent to which a satisfactory basis exists for the application of an effects-based approach;
 - (c) The procedures, methods and timing for such reviews shall be specified by the Parties at a session of the Executive Body.
4. The Parties shall consider, based on the conclusion of the reviews referred to in paragraph 3 above and as soon as practicable after completion of the review, developing a workplan on further steps.

Article 11

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 organization 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 recognizes one or both of the following means of dispute settlement as compulsory *ipso facto* and without special 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 organization 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 equal numbers of members appointed by each Party concerned or, where the Parties in conciliation share the same interest, by the group sharing that interest, and a chairperson chosen jointly by the members so appointed. The commission shall render a recommendatory award, which the Parties shall consider in good faith.

Article 12

Annexes

The annexes to the present Protocol shall form an integral part of the Protocol. Annexes III and VII are recommendatory in character.

Article 13

Amendments to the protocol

1. Any Party may propose amendments to the present Protocol.

2. Proposed amendments shall be submitted in writing to the Executive Secretary of the Commission, who shall communicate them to all Parties. The Parties meeting within the Executive Body shall discuss the proposed amendments at its next session, provided that the proposals have been circulated by the Executive Secretary to the Parties at least 90 days in advance.

3. Amendments to the present Protocol other than to annexes III and VII 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 ninetieth day after the date on which two thirds of those that were Parties at the time of their adoption have deposited with the Depositary their instruments of acceptance thereof. Amendments shall enter into force for any other Party on the ninetieth day after the date on which that Party has deposited its instrument of acceptance thereof.

4. Amendments to annexes III and VII shall be adopted by consensus of the Parties present at a session of the Executive Body. On the expiry of 180 days from the date of its

communication to all Parties 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 annex III or VII shall so notify the Depositary in writing within 180 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, upon deposit of an instrument of acceptance with the Depositary, the amendment to such an annex shall become effective for that Party.

5 bis. For those Parties having accepted it, the procedure set out in paragraph 5 ter supersedes the procedure set out in paragraph 3 in respect of amendments to annexes II, IV, V and VI;

5 ter. Amendments to annexes II, IV, V and VI shall be adopted by consensus of the Parties present at a session of the Executive Body. On the expiry of one year from the date of its communication to all Parties 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 subparagraph (a):

(a) Any Party that is unable to approve an amendment to annexes II, IV, V and VI shall so notify the Depositary in writing within one year 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, upon deposit of an instrument of acceptance with the Depositary, the amendment to such an annex shall become effective for that Party;

(b) Any amendment to annexes II, IV, V and VI shall not enter into force if an aggregate number of 16 or more Parties have either:

(i) Submitted a notification in accordance with the provisions of subparagraph (a); or

(ii) Not accepted the procedure set out in this paragraph and not yet deposited an instrument of acceptance in accordance with the provisions of paragraph 3.

6. In the case of a proposal to amend annex I, VI or VII by adding a heavy metal, a product control measure or a product or product group to the present Protocol:

(a) The proposer shall provide the Executive Body with the information specified in Executive Body decision 1998/1, including any amendments thereto; and

(b) The Parties shall evaluate the proposal in accordance with the procedures set forth in Executive Body decision 1998/1, including any amendments thereto.

7. Any decision to amend Executive Body decision 1998/1 shall be taken by consensus of the Parties meeting within the Executive Body and shall take effect 60 days after the date of adoption.

Article 14

Signature

1. The present Protocol shall be open for signature at Aarhus (Denmark) from 24 to 25 June 1998, then at United Nations Headquarters in New York until 21 December 1998 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 organizations, 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 organizations concerned are Parties to the Convention.

2. In matters within their competence, such regional economic integration organizations 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 organizations shall not be entitled to exercise such rights individually.

Article 15

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 21 December 1998 by the States and organizations that meet the requirements of article 14, paragraph 1.

3. A State or regional economic integration organization shall declare in its instrument of ratification, acceptance, approval or accession if it does not intend to be bound by the procedures set out in article 13, paragraph 5 ter, as regards the amendment of annexes II, IV, V and VI.

Article 16

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 17

Entry into force

1. The present Protocol shall enter into force on the ninetieth day following the date on which the sixteenth instrument of ratification, acceptance, approval or accession has been deposited with the Depositary.

2. For each State and organization referred to in article 14, paragraph 1, which ratifies, accepts or approves the present Protocol or accedes thereto after the deposit of the sixteenth instrument of ratification, acceptance, approval or accession, the Protocol shall enter into force on the ninetieth day following the date of deposit by such Party of its instrument of ratification, acceptance, approval or accession.

Article 18

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 ninetieth 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 19

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 authorized thereto, have signed the present Protocol.

DONE at Aarhus (Denmark), this twenty-fourth day of June, one thousand nine hundred and ninety-eight.

Annex I**Heavy metals referred to in article 3, paragraph 1, and the reference year for the obligation**

<i>Heavy metal</i>	<i>Reference year</i>
Cadmium (Cd)	1990; or an alternative year from 1985 to 1995 inclusive, specified by a Party upon ratification, acceptance, approval or accession.
Lead (Pb)	1990; or an alternative year from 1985 to 1995 inclusive, specified by a Party upon ratification, acceptance, approval or accession.
Mercury (Hg)	1990; or an alternative year from 1985 to 1995 inclusive, specified by a Party upon ratification, acceptance, approval or accession.

Annex II

Stationary source categories

I. Introduction

1. Installations or parts of installations for research, development and the testing of new products and processes are not covered by this annex.
2. The threshold values given below generally refer to production capacities or output. Where one operator carries out several activities falling under the same subheading at the same installation or the same site, the capacities of such activities are added together.

II. List of categories

<i>Category</i>	<i>Description of the category</i>
1	Combustion installations with a net rated thermal input exceeding 50 MW.
2	Metal ore (including sulphide ore) or concentrate roasting or sintering installations with a capacity exceeding 150 tonnes of sinter per day for ferrous ore or concentrate, and 30 tonnes of sinter per day for the roasting of copper, lead or zinc, or any gold and mercury ore treatment.
3	Installations for the production of pig-iron or steel (primary or secondary fusion, including electric arc furnaces) including continuous casting, with a capacity exceeding 2.5 tonnes per hour.
4	Ferrous metal foundries with a production capacity exceeding 20 tonnes per day.
5	Installations for the production of copper, lead, zinc and silico- and ferro-manganese alloys from ore, concentrates or secondary raw materials by metallurgical processes with a capacity exceeding 30 tonnes of metal per day for primary installations and 15 tonnes of metal per day for secondary installations, or for any primary production of mercury.
6	Installations for the smelting (refining, foundry casting, etc.), including the alloying, of copper, lead and zinc including recovered products, with a melting capacity exceeding 4 tonnes per day for lead or 20 tonnes per day for copper and zinc.
7	Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tonnes per day or in other furnaces with a production capacity exceeding 50 tonnes per day.
8	Installations for the manufacture of glass using lead in the process with a melting capacity exceeding 20 tonnes per day.
9	Installations for chlor-alkali production by electrolysis using the mercury cell process.
10	Installations for the incineration of hazardous or medical waste with a capacity exceeding 1 tonne per hour, or for the co-incineration of hazardous or medical waste specified in accordance with national legislation.

<i>Category</i>	<i>Description of the category</i>
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11	Installations for the incineration of municipal waste with a capacity exceeding 3 tonnes per hour, or for the co-incineration of municipal waste specified in accordance with national legislation.
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Annex III

Best available techniques for controlling emissions of heavy metals and their compounds from the source categories listed in annex II

1. This annex aims to provide Parties with guidance on identifying best available techniques for stationary sources to enable them to meet the obligations of the Protocol. Further description of and guidance on such best available techniques are provided in a guidance document adopted by the Parties at a session of the Executive Body and may be updated as necessary by a consensus of the Parties meeting within the Executive Body.

2. The expression “best available techniques” (BAT) means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing the basis for emission limit values (and other permit conditions) designed to prevent and, where that is not practicable, to reduce emissions and their impact on the environment as a whole:

(a) “Techniques” includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned;

(b) “Available” techniques means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the territory of the Party in question, as long as they are reasonably accessible to the operator;

(c) “Best” means most effective in achieving a high general level of protection of the environment as a whole.

3. Criteria for determining BAT are as follows:

(a) The use of low-waste technology;

(b) The use of less hazardous substances;

(c) The furthering of recovery and recycling of substances generated and used in the process and of waste, where appropriate;

(d) Comparable processes, facilities or methods of operation which have been tried with success on an industrial scale;

(e) Technological advances and changes in scientific knowledge and understanding;

(f) The nature, effects and volume of the emissions concerned;

(g) The commissioning dates for new or existing installations;

(h) The length of time needed to introduce the best available technique;

(i) The consumption and nature of raw materials (including water) used in the process and energy efficiency;

- (j) The need to prevent or reduce to a minimum the overall impact of the emissions on the environment and the risks to it;
- (k) The need to prevent accidents and to minimize their consequences for the environment;
- (l) Information published by national and international organizations.

The concept of BAT is not aimed at the prescription of any specific technique or technology, but at taking into account the technical characteristics of the installation concerned, its geographical location and the local environmental conditions.

4. Experience with new products and new plants incorporating low-emission techniques, as well as with the retrofitting of existing plants, is growing continuously; the guidance document referred to in paragraph 1 may, therefore, need updating.

Annex IV

Timescales for the application of limit values and best available techniques to new and existing stationary sources

1. The timescales for the application of limit values and best available techniques are:
 - (a) For new stationary sources: two years after the date of entry into force of the present Protocol for a Party;
 - (b) For existing stationary sources: two years after the date of entry into force of the present Protocol for a Party or 31 December 2020, whichever is the later.
2. Notwithstanding paragraph 1, but subject to paragraph 3, a Party to the Convention that becomes a Party to the present Protocol between 1 January 2014 and 31 December 2019 may declare upon ratification, acceptance, approval of, or accession to the present Protocol that it will extend the timescales for application of the limit values referred to in article 3, paragraph 2 (d), up to 15 years after the date of entry into force of the present Protocol for the Party in question.
3. A Party that has made an election pursuant to article 3 bis of the present Protocol with respect to a particular stationary source category may not also make a declaration pursuant to paragraph 2 applicable to the same source category.

Annex V

Limit values for controlling emissions from major stationary sources

1. Two types of limit value are important for heavy metal emission control:
 - (a) Values for specific heavy metals or groups of heavy metals; and
 - (b) Values for emissions of particulate matter in general.
2. In principle, limit values for particulate matter cannot replace specific limit values for cadmium, lead and mercury because the quantity of metals associated with particulate emissions differs from one process to another. However, compliance with these limits contributes significantly to reducing heavy metal emissions in general. Moreover, monitoring particulate emissions is generally less expensive than monitoring individual species and continuous monitoring of individual heavy metals is in general not feasible. Therefore, particulate matter limit values are of great practical importance and are also laid down in this annex in most cases to complement specific limit values for cadmium, lead or mercury.
3. Section A applies to Parties other than the United States of America. Section B applies to the United States of America.

A. Parties other than the United States of America

4. In this section only, “dust” means the mass of particles, of any shape, structure or density, dispersed in the gas phase at the sampling point conditions which may be collected by filtration under specified conditions after representative sampling of the gas to be analysed, and which remain upstream of the filter and on the filter after drying under specified conditions.
5. For the purpose of this section, “emission limit value” (ELV) or “limit value” means the quantity of dust and specific heavy metals under this Protocol contained in the waste gases from an installation that is not to be exceeded. Unless otherwise specified, it shall be calculated in terms of mass of pollutant per volume of the waste gases (expressed as mg/m³), assuming standard conditions for temperature and pressure for dry gas (volume at 273.15 K, 101.3 kPa). With regard to the oxygen content of the waste gas, the values given for selected major stationary source categories shall apply. Dilution for the purpose of lowering concentrations of pollutants in waste gases is not permitted. Start-up, shutdown and maintenance of equipment are excluded.
6. Emissions shall be monitored in all cases via measurements or through calculations achieving at least the same accuracy. Compliance with limit values shall be verified through continuous or discontinuous measurements, or any other technically sound method including verified calculation methods. Measurements of relevant heavy metals shall be made at least once every three years for each industrial source. Guidance documents on the methods for undertaking measurements and calculations adopted by the Parties at the session of the Executive Body shall be taken into account. In case of continuous measurements, compliance with the limit value is achieved if the validated monthly emission average does not exceed the ELV. In case of discontinuous measurements or other appropriate determination or calculation procedures, compliance with the ELVs is achieved if the mean value based on an appropriate number of measurements under representative

conditions does not exceed the value of the emission standard. The inaccuracy of the measurement methods may be taken into account for verification purposes. Indirect monitoring of substances is also possible via sum parameters/cumulative parameters (e.g., dust as a sum parameter for heavy metals). In some cases using a certain technique to treat emissions can assure a value/limit value is maintained or met.

7. Monitoring of relevant polluting substances and measurements of process parameters, as well as the quality assurance of automated measuring systems and the reference measurements to calibrate those systems, shall be carried out in accordance with CEN standards. If CEN standards are not available, ISO standards, national standards or international standards which will ensure the provisions of data of an equivalent scientific quality shall apply.

Combustion plants (boilers and process heaters) with a rated thermal input exceeding 50 MWth¹ (annex II, category 1)

8. Limit values for dust emissions for combustion of solid and liquid fuels, other than biomass and peat:²

Table 1

<i>Fuel type</i>	<i>Thermal input (MWth)</i>	<i>ELV for dust (mg/m³)^a</i>
Solid fuels	50–100	New plants: 20 (coal, lignite and other solid fuels)
		Existing plants: 30 (coal, lignite and other solid fuels)
	100–300	New plants: 20 (coal, lignite and other solid fuels)
		Existing plants: 25 (coal, lignite and other solid fuels)

¹ The rated thermal input of the combustion plant is calculated as the sum of the input of all units connected to a common stack. Individual units below 15 MWth shall not be considered when calculating the total rated thermal input.

² In particular, the ELVs shall not apply to:

- Plants using biomass and peat as their only fuel source;
- Plants in which the products of combustion are used for direct heating, drying, or any other treatment of objects or materials;
- Post-combustion plants designed to purify the waste gases by combustion which are not operated as independent combustion plants;
- 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;
- Recovery boilers within installations for the production of pulp;
- Waste incinerators; and
- Plants powered by diesel, petrol or gas engines or by combustion turbines, irrespective of the fuel used.

<i>Fuel type</i>	<i>Thermal input (MWth)</i>	<i>ELV for dust (mg/m³)^a</i>
	>300	New plants: 10 (coal, lignite and other solid fuels) Existing plants: 20 (coal, lignite and other solid fuels)
Liquid fuels	50–100	New plants: 20 Existing plants: 30 (in general) 50 for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants
Liquid fuels	100–300	New plants: 20 Existing plants: 25 (in general) 50 for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants
	>300	New plants: 10 Existing plants: 20 (in general) 50 for the firing of distillation and conversion residues within refineries from the refining of crude oil for own consumption in combustion plants

^a Limit values refer to an oxygen content of 6% for solid fuels and 3% for liquid fuels.

9. Special provisions for combustion plants referred to in paragraph 8:
- (a) A Party may derogate from the obligation to comply with the ELVs provided for in paragraph 8 in the following cases:
- (i) For combustion plants normally using gaseous fuel which have to resort exceptionally to the use of other fuels because of a sudden interruption in the supply of gas and for this reason would need to be equipped with a waste gas purification facility;
- (ii) For existing combustion plants not operated more than 17,500 operating hours, starting from 1 January 2016 and ending no later than 31 December 2023;
- (b) Where a combustion plant is extended by at least 50 MWth, the ELV specified in paragraph 8 for new installations shall apply to the extensional part affected by the change. The ELV is calculated as an average weighted by the actual thermal input for both the existing and the new part of the plant;
- (c) Parties shall ensure that provisions are made for procedures relating to malfunction or breakdown of the abatement equipment;

(d) In the case of a multi-fuel firing combustion plant involving the simultaneous use of two or more fuels, the ELV shall be determined as the weighted average of the ELVs for the individual fuels, on the basis of the thermal input delivered by each fuel.

Primary and secondary iron and steel industry (annex II, category 2 and 3)

10. Limit values for dust emissions:

Table 2

<i>Activity</i>	<i>ELV for dust (mg/m³)</i>
Sinter plant	50
Pelletization plant	20 for crushing, grinding and drying 15 for all other process steps
Blast furnace: hot stoves	10
Basic oxygen steelmaking and casting	30
Electric steelmaking and casting	15 (existing) 5 (new)

Iron foundries (annex II, category 4)

11. Limit values for dust emissions for iron foundries:

Table 3

<i>Activity</i>	<i>ELV for dust (mg/m³)</i>
Iron foundries: all furnaces (cupola, induction, rotary); all mouldings (lost, permanent)	20
Hot rolling	20 50 where a bag filter cannot be applied due to the presence of wet fumes

Production and processing of copper, zinc and silico- and ferro- manganese alloys, including Imperial Smelting furnaces (annex II, categories 5 and 6)

12. Limit value for dust emissions for copper, zinc and silico- and ferro-manganese alloys production and processing:

Table 4

<i>Activity</i>	<i>ELV for dust (mg/m³)</i>
Non-ferrous metal production and processing	20

Production and processing of lead (annex II, categories 5 and 6)

13. Limit value for dust emissions for lead production and processing:

Table 5

<i>ELV for dust (mg/m³)</i>	
Lead production and processing	5

Cement industry (annex II, category 7)

14. Limit values for dust emissions for cement production:

Table 6

<i>ELV for dust (mg/m³)^a</i>	
Cement installations, kilns, mills and clinker coolers	20
Cement installations, kilns, mills and clinker coolers using co-incineration of waste	20

^a Limit values refer to an oxygen content of 10%.

Glass industry (annex II, category 8)

15. Limit values for dust emissions for glass manufacturing:

Table 7

<i>ELV for dust (mg/m³)^a</i>	
New installations	20
Existing installations	30

^a Limit values refer to an oxygen content of 8% for continuous melting and 13% for discontinuous melting.

16. Limit value for lead emissions for glass manufacturing: 5 mg/m³.

Chlor-alkali industry (annex II, category 9)

17. Existing chlor-alkali plants using the mercury cell process shall convert to use of mercury free technology or close by 31 December 2020; during the period up until conversion the levels of mercury released by a plant into the air of 1 g per Mg³ chlorine production capacity apply.

18. New chlor-alkali plants are to be operated mercury free.

³ 1 Mg = 1 tonne.

Waste incineration (annex II, categories 10 and 11)

19. Limit value for dust emissions for waste incineration:

Table 8

	<i>ELV for dust (mg/m³)^a</i>
Municipal, non-hazardous, hazardous and medical waste incineration	10

^a Limit value refers to an oxygen content of 11%.

20. Limit value for mercury emissions for waste incineration: 0.05 mg/m³.

21. Limit value for mercury emissions for co-incineration of waste in source categories 1 and 7: 0.05 mg/m³.

B. United States of America

22. Limit values for controlling emissions of particulate matter and/or specific heavy metals from stationary sources in the following stationary source categories, and the sources to which they apply, are specified in the following documents:

- (a) Steel Plants: Electric Arc Furnaces — 40 C.F.R. Part 60, Subpart AA and Subpart AAa;
- (b) Small Municipal Waste Combustors — 40 C.F.R. Part 60, Subpart AAAA;
- (c) Glass Manufacturing — 40 C.F.R. Part 60, Subpart CC;
- (d) Electric Utility Steam Generating Units — 40 C.F.R. Part 60, Subpart D and Subpart Da;
- (e) Industrial-Commercial-Institutional Steam Generating Units — 40 C.F.R. Part 60, Subpart Db and Subpart Dc;
- (f) Municipal Waste Incinerators — 40 C.F.R. Part 60, Subpart E, Subpart Ea and Subpart Eb;
- (g) Hospital/Medical/Infectious Waste Incinerators — 40 C.F.R. Part 60, Subpart Ec;
- (h) Portland Cement — 40 C.F.R. Part 60, Subpart F;
- (i) Secondary Lead Smelters — 40 C.F.R. Part 60, Subpart L;
- (j) Basic Oxygen Process Furnaces — 40 C.F.R. Part 60, Subpart N;
- (k) Basic Process Steelmaking Facilities (after 20 January 1983) — 40 C.F.R. Part 60, Subpart Na;
- (l) Primary Copper Smelters — 40 C.F.R. Part 60, Subpart P;
- (m) Primary Zinc Smelters — 40 C.F.R. Part 60, Subpart Q;
- (n) Primary Lead Smelters — 40 C.F.R. Part 60, Subpart R;
- (o) Ferroalloy Production Facilities — 40 C.F.R. Part 60, Subpart Z;

- (p) Other Solid Waste Incineration Units (after 9 December 2004) — 40 C.F.R. Part 60, Subpart EEEE;
- (q) Secondary lead smelters — 40 C.F.R. Part 63, Subpart X;
- (r) Hazardous waste combustors — 40 C.F.R. Part 63, Subpart EEE;
- (s) Portland cement manufacturing — 40 C.F.R. Part 63, Subpart LLL;
- (t) Primary copper — 40 C.F.R. Part 63, Subpart QQQ;
- (u) Primary lead smelting — 40 C.F.R. Part 63, Subpart TTT;
- (v) Iron and steel foundries — 40 C.F.R. Part 63, Subpart EEEEE;
- (w) Integrated iron and steel manufacturing — 40 C.F.R. Part 63, Subpart FFFFF;
- (x) Electric Arc Furnace Steelmaking Facilities — 40 C.F.R. Part 63, Subpart YYYYY;
- (y) Iron and steel foundries — 40 C.F.R. Part 63, Subpart ZZZZZ;
- (z) Primary Copper Smelting Area Sources — 40 C.F.R. Part 63, Subpart EEEEEEE;
- (aa) Secondary Copper Smelting Area Sources — 40 C.F.R. Part 63, Subpart FFFFFFF;
- (bb) Primary Nonferrous Metals Area Sources: Zinc, Cadmium, and Beryllium — 40 C.F.R. Part 63, Subpart GGGGGG;
- (cc) Glass manufacturing (area sources) — 40 C.F.R. Part 63, Subpart SSSSSS;
- (dd) Secondary Nonferrous Metal Smelter (Area Sources) — 40 C.F.R. Part 63, Subpart TTTTTT;
- (ee) Ferroalloys Production (Area Sources) — 40 C.F.R. Part 63, Subpart YYYYYYY;
- (ff) Aluminum, Copper, and Nonferrous Foundries (Area Sources) — 40 C.F.R. Part 63, Subpart ZZZZZZ;
- (gg) Standards of Performance for Coal Preparation and Processing Plants — 40 C.F.R. Part 60, Subpart Y;
- (hh) Industrial, Commercial, Institutional and Process Heaters — 40 C.F.R. Part 63, Subpart DDDDD;
- (ii) Industrial, Commercial and Institutional Boilers (Area Sources) — 40 C.F.R. Part 63, Subpart JJJJJ;
- (jj) Mercury Cell Chlor-Alkali Plants — 40 C.F.R. Part 63, Subpart IIII; and
- (kk) Standards of Performance Commercial and Industrial Solid Waste Incineration Units for which Construction is Commenced after November 30, 1999, or for which Modification or Reconstruction is Commenced on or after 1 June 2001 — 40 C.F.R. Part 60, Subpart CCCC.

Annex VI

Product control measures

1. No later than the date of entry into force of the present Protocol for a Party, the lead content of marketed petrol intended for on-road vehicles shall not exceed 0.013 g/l. Parties marketing unleaded petrol with a lead content lower than 0.013 g/l shall endeavour to maintain or lower that level.

2. Each Party shall endeavour to ensure that the change to fuels with a lead content as specified in paragraph 1 above results in an overall reduction in the harmful effects on human health and the environment.

[Paragraph 3 is deleted.]

4. Notwithstanding paragraph 1, a Party is permitted to market small quantities, up to 0.5 per cent of its total petrol sales, of leaded petrol with a lead content not exceeding 0.15 g/l to be used by old on-road vehicles.

5. Each Party shall, no later than the date of entry into force of this Protocol for that Party, achieve concentration levels which do not exceed:

(a) 0.05 per cent of mercury by weight in alkaline manganese batteries for prolonged use in extreme conditions (e.g., temperature below 0°C or above 50°C, exposed to shocks); and

(b) 0.025 per cent of mercury by weight in all other alkaline manganese batteries.

The above limits may be exceeded for a new application of a battery technology, or use of a battery in a new product, if reasonable safeguards are taken to ensure that the resulting battery or product without an easily removable battery will be disposed of in an environmentally sound manner. Alkaline manganese button cells and batteries composed of button cells shall also be exempted from this obligation.

Annex VII

Product management measures

1. This annex aims to provide guidance to Parties on product management measures.
2. The Parties may consider appropriate product management measures such as those listed below, where warranted as a result of the potential risk of adverse effects on human health or the environment from emissions of one or more of the heavy metals listed in annex I, taking into account all relevant risks and benefits of such measures, with a view to ensuring that any changes to products result in an overall reduction of harmful effects on human health and the environment:
 - (a) The substitution of products containing one or more intentionally added heavy metals listed in annex I, if a suitable alternative exists;
 - (b) The minimization or substitution in products of one or more intentionally added heavy metals listed in annex I;
 - (c) The provision of product information including labelling to ensure that users are informed of the content of one or more intentionally added heavy metals listed in annex I and of the need for safe use and waste handling;
 - (d) The use of economic incentives or voluntary agreements to reduce or eliminate the content in products of the heavy metals listed in annex I; and
 - (e) The development and implementation of programmes for the collection, recycling or disposal of products containing one of the heavy metals in annex I in an environmentally sound manner.
3. Each product or product group listed below contains one or more of the heavy metals listed in annex I and is the subject of regulatory or voluntary action by at least one Party to the Convention based for a significant part on the contribution of that product to emissions of one or more of the heavy metals in annex I. However, sufficient information is not yet available to confirm that they are a significant source for all Parties, thereby warranting inclusion in annex VI. Each Party is encouraged to consider available information and, where satisfied of the need to take precautionary measures, to apply product management measures such as those listed in paragraph 2 above to one or more of the products listed below:
 - (a) Mercury-containing electrical components, i.e., devices that contain one or several contacts/sensors for the transfer of electrical current such as relays, thermostats, level switches, pressure switches and other switches (actions taken include a ban on most mercury-containing electrical components; voluntary programmes to replace some mercury switches with electronic or special switches; voluntary recycling programmes for switches; and voluntary recycling programmes for thermostats);
 - (b) Mercury-containing measuring devices such as thermometers, manometers, barometers, pressure gauges, pressure switches and pressure transmitters (actions taken include a ban on mercury-containing thermometers and ban on measuring instruments);
 - (c) Mercury-containing fluorescent lamps (actions taken include reductions in mercury content per lamp through both voluntary and regulatory programmes and voluntary recycling programmes);

(d) Mercury-containing dental amalgam (actions taken include voluntary measures and a ban with exemptions on the use of dental amalgams and voluntary programmes to promote capture of dental amalgam before release to water treatment plants from dental surgeries);

(e) Mercury-containing pesticides including seed dressing (actions taken include bans on all mercury pesticides including seed treatments and a ban on mercury use as a disinfectant);

(f) Mercury-containing paint (actions taken include bans on all such paints; bans on such paints for interior use and use on children's toys; and bans on use in antifouling paints); and

(g) Mercury-containing batteries other than those covered in annex VI (actions taken include reductions in mercury content through both voluntary and regulatory programmes and environmental charges and voluntary recycling programmes).
