



**Economic and Social
Council**

Distr.
GENERAL

EB.AIR/WG.1/2000/3
13 June 2000

Original: ENGLISH

ECONOMIC COMMISSION FOR EUROPE

EXECUTIVE BODY FOR THE CONVENTION ON
LONG-RANGE TRANSBOUNDARY AIR POLLUTION

Working Group on Effects
(Nineteenth session, Geneva, 23-25 August 2000)
Items 4 and 7 of the provisional agenda

2000 JOINT REPORT
OF THE INTERNATIONAL COOPERATIVE PROGRAMMES AND
THE TASK FORCE ON THE HEALTH ASPECTS OF AIR POLLUTION

Report compiled by the secretariat in collaboration with
the Extended Bureau of the Working Group on Effects

I. INTRODUCTION

1. At its seventeenth session, the Executive Body decided that the secretariat should prepare a draft annual summary report on progress in effects-oriented activities on the basis of the information provided by the lead countries and the programme coordinating centres (ECE/EB.AIR/68, annex IV, section 3.1.1). The Extended Bureau of the Working Group on Effects, at its meeting in Berlin from 3 to 4 February 2000, agreed on the outline for the 2000 joint report.

Documents prepared under the auspices or at the request of the Executive Body for the Convention on Long-range Transboundary Air Pollution for GENERAL circulation should be considered provisional unless APPROVED by the Executive Body.

2. Chapter II of the report contains a draft outline for the 2001 substantive report on the occurrence, movement and effects of selected heavy metals in the environment. The report also reviews, in its annexes, the achievements of the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution since the eighteenth session of the Working Group on Effects, and presents the lists of activities/tasks to be addressed in the coming year, as proposed by the programmes in response to the priority needs of the Executive Body.

II. DRAFT OUTLINE FOR THE 2001 SUBSTANTIVE REPORT ON THE OCCURRENCE, MOVEMENT AND EFFECTS OF SELECTED HEAVY METALS

3. The Executive Body at its seventeenth session decided on the preparation of a 2001 substantive report and requested the Working Group on Effects at its nineteenth session to agree on the structure of the report and on the organization of work (ECE/EB.AIR/68, annex IV, section 3.1.2).

4. The Extended Bureau of the Working Group on Effects, at its meeting in February 2000, agreed on a draft outline for the substantive report on the occurrence, movement and effects of selected heavy metals in the environment, especially those involved in, or influenced by, the long-range transport of atmospheric pollution.

5. The substantive report will be based on the experience, results and the comprehensive data sets of the International Cooperative Programmes (ICPs) and the Task Force on the Health Aspects of Air Pollution. It will also make use of relevant data and information provided by EMEP. The report will be finalized by the Extended Bureau of the Working Group on Effects and presented to the Working Group at its twentieth session in 2001.

6. The following draft annotated outline has been drawn up taking into consideration expected contributions from ICPs and the Task Force on the Health Aspects of Air Pollution.

Chapter I. Introduction

- A. Activities of the Executive Body aiming at the control of heavy metals
- B. 1998 Protocol on Heavy Metals
- C. Results of recent workshops dealing with heavy metals (Bad Harzburg 1997, Schwerin 1999)
- D. Contributions from the ICPs of the Working Group on Effects
- E. Structure of the report

Chapter II. Occurrence in and impact of heavy metals on forest ecosystems, in particular on forest soils

- A. Introduction
(Description of the ICP Forest programme with emphasis on work to monitor the heavy metal content of forest soils)

- B. The ICP Forests database on heavy metals in forest soils
(For level I, most heavy metals data have been submitted for the organic layers of forest soils (in total about 3600 of the 5278 plots in 31 countries); fewer data are available for the mineral layers. Data on the total contents of Cd, Cu, Pb and Zn cover about 30-40% of the plots. Heavy metal deposition has been considered in more detail for the 865 intensive monitoring sites (level II sites) spread over 29 countries. Most deposition data have been submitted for cadmium (176 plots) and copper (196), while zinc and lead are less available (66 and 29 plots respectively). Soil solution concentrations have been reported for cadmium (38), lead (37), copper (48) and zinc (52).)
- C. Patterns in the heavy metal content of soils
(The level I and level II data will be analysed to show the range of heavy metal concentrations found in the organic, mineral layers, and soil solutions of the soils at ICP Forests sites. Typical data for deposition rates will be presented.)
- D. Contribution to risk assessment and critical loads/limits
(The potential for using the ICP Forests data to validate heavy metal deposition modelling will be evaluated.)

Chapter III. Assessment of data on heavy metals in surface waters

- A. Introduction
(Description of the ICP Waters programme with emphasis on work to monitor the heavy metal content of surface waters.)
- B. The ICP Waters database on heavy metal content of surface waters
(The ICP Waters database contains a number of sites with heavy metal data, but these are located in only a few of the participating countries. Few sites have long time series on heavy metals. The analytical methods have changed and the detection limit has generally decreased through the monitoring period for the sites with long-term trends. So far, 9 countries have reported data on heavy metals to the Programme Centre in the past three years (1996-98). Of these, 8 have submitted data on Pb and Cd, 9 on Zn and Cu, and 5 on Ni. The results of the first ICP Waters intercalibration exercise for heavy metals will be presented. Other sources of data on the heavy metal content of surface waters will be reviewed.)
- C. Heavy metals contents of lakes
(Several countries have carried out synoptic surveys of heavy metals in surface waters. As the analytical methods and hence detection limits have changed over time, only the results from the most recent surveys will be compared.)
- D. Long-term trends in heavy metal content
(Due to the limited number of sites with heavy metals data and because of the shortcomings in the data (short series, changes in analytical methods), it is at present not possible to analyse long-term trends in heavy metals on a regional scale, in a similar way as for acidification.)
- E. Application of ICP Waters data to the determination of critical limits of heavy metals
(Discussion of the factors that need to be considered, and a compilation of data on existing critical limits in participating countries will be included.)

Chapter IV. Deposition of heavy metals to crops and natural vegetation

A. Introduction

(Description of the ICP Vegetation programme with emphasis on work to monitor the heavy metal content of crops and natural vegetation.)

B. The ICP Vegetation database

1. Heavy metal content of clover foliage

(Description of the methods used to assess the lead, cadmium, copper and arsenic content of the foliage and growth medium of white clover grown at 18 ICP Vegetation sites in 11 countries in 1998. Validation of the method will be discussed. New data will be collected from the sampling regime planned for the summer of 2000.)

2. The “Heavy Metals in Mosses” data

(An existing large-scale project monitoring the heavy metal content of mosses in 30 European countries will be transferred to ICP Vegetation in 2001. A description of the existing data from past surveys and the year 2000 survey will be included.)

C. Heavy metal content of crops

(The concentrations in the foliage of clover will be described, and related to likely sources of contamination such as local, medium- and long-range transport. Other sources of data on the heavy metal content of crops will be reviewed.)

D. Application of ICP Vegetation data to the determination of critical limits, and critical load mapping

(Comparisons will be made between actual and modelled deposition rates. Data on critical limits for heavy metal content of crops will be collated for the participating countries. The links to health effects will be discussed. Methods for using the ICP Vegetation data to validate the critical loads maps will be considered, including an appraisal of the “heavy metals in mosses” data and its potential uses.)

Chapter V. Heavy metal concentrations in different ecosystem compartments

A. Introduction

(Description of the ICP Integrated Monitoring programme with emphasis on work to monitor the heavy metals in ecosystems.)

B. The ICP Integrated Monitoring database on heavy metals

(An overview of the heavy metals component of the ICP IM database will be provided. A short review of previous heavy metal studies carried out at the sites will also be included.)

C. Modelling of soil water fluxes for budget calculations at ICP IM sites

(A brief description of the WATBAL model and of site-specific modelling activities.)

D. Assessment of concentrations, fluxes and stores of heavy metals at selected ICP IM sites

(Concentration data from selected ICP IM sites will be assessed; calculated fluxes and pools of selected heavy metals will be presented including input-output budgets. The role of upland soils as a source of methylmercury in fish will be included.)

E. Contribution of ICP Integrated Monitoring data to the evaluation of critical limits/loads and their mapping

(ICP Integrated Monitoring deposition data will be compared with information from EMEP

and other sources. The ICP IM data will be assessed in relation to critical limits/loads of heavy metals.)

Chapter VI. Release of heavy metals due to corrosion of materials

- A. Introduction
(Description of the ICP Materials programme with emphasis on the work being conducted on the release of heavy metals due to corrosion of materials. The basic concepts will be described.)
- B. The ICP Materials database
(The relevant data available in the ICP Materials database for the period 1987-1997 will be reviewed.)
- C. Analysis of the impact of acidification on the release of Zn and Cu
(A statistical analysis of run-off data of Cu and Zn and environmental data will result in dose-response relationships showing the impact of dry and wet deposition of acidifying pollutants.)
- D. Assessment of movement of metals in selected areas
(Using the dose-response relationships, an analysis will be performed of the movement of heavy metals in areas where data on stock of materials at risk are available.)
- E. Contribution of ICP Materials data to the assessment of heavy metals in the environment
(Possible ICP Materials inputs into the debate on critical limits/loads for heavy metals will be considered. The importance of materials as sources of heavy metals will also be reviewed.)

Chapter VII. Human health effects of heavy metals from long-range transboundary air pollution

- A. Introduction
(Description of the Task Force on Health programme with emphasis on the work being conducted on the effects of heavy metals on human health.)
- B. The Task Force on Health database on heavy metals
(Sources of information on the health risk of environmental exposure to cadmium, lead and mercury will be considered.)
- C. Review of available data on concentrations of heavy metals and their possible health effects
- D. Contribution of the Task Force on Health information to the assessment of critical limits for heavy metals
(The concentrations in the environment, and various routes of exposure will be considered in relation to critical limits for health. Other potential uses of ICP Vegetation and ICP Waters data will also be considered.)

Chapter VIII.

Mapping critical limits/loads of heavy metals

- A. Introduction
(Description of the ICP Modelling and Mapping programme with emphasis on the work being conducted on mapping critical limits/loads of heavy metals.)

- B. Methods to compute and map critical loads on a European scale
(The method by which critical limits/loads of heavy metals can be computed and mapped on a European scale will be presented. It will draw on the methodology described in the manuals for calculating critical loads of heavy metals for terrestrial and aquatic ecosystems. Methods to map critical loads for ecosystems in EMEP grid cells will be emphasized and deposition-modelling background information for the computation of exceedances in collaboration with the Meteorological Synthesizing Centre - East (MSC-E) will be described.)
- C. The production of preliminary European maps of critical loads of heavy metals using European data
(Using European input data, i.e. not data provided by National Focal Centres, a preliminary map of critical loads of heavy metals will be produced on the basis of the methods mentioned under section B above.)
- D. Use of heavy metals data from ICPs
(The potential for using the data from ICPs to validate deposition and exceedance maps will be considered.)

Chapter IX. Conclusions and recommendations

Annex I

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL
COOPERATIVE PROGRAMME ON ASSESSMENT AND MONITORING OF AIR
POLLUTION EFFECTS ON FORESTS (ICP FORESTS)

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON
EFFECTS

1. The sixteenth meeting of the Task Force of ICP Forests took place from 20 to 24 May 2000 in Ghent (Belgium) and was attended by 65 experts representing 28 Parties to the Convention.
2. ICP Forests finalized its internal evaluation and summarized the results in a review paper. The Task Force at its sixteenth meeting adopted a strategy for the years 2001 – 2006, based on the results of the internal evaluation and on the priorities of the Executive Body for the Convention and the Working Group on Effects. The strategy paper defined the following aims of ICP Forests:
 - (a) To monitor the effects of anthropogenic stress factors (in particular air pollution) and natural stress factors on the condition and development of forest ecosystems in Europe;
 - (b) To contribute to a better understanding of cause-effect relationships in forest ecosystem functioning in various parts of Europe.
3. The evaluation of level II data focused on sulphur and nitrogen depositions and their effects on element concentrations in forest soils and tree foliage. Level I data continued to be evaluated in relation to environmental parameters using multivariate statistics.
4. The Expert Panel on Deposition edited a sub-manual on ambient air quality measurements. The Expert Panels on Foliage Analyses and on Forest Growth updated their sub-manuals. The Task Force of ICP Forests at its sixteenth meeting adopted the sub-manuals and forwarded them to the Programme Coordinating Centre for inclusion into the ICP Forests manual.
5. The following three intercalibration courses on crown condition assessments were organized in June 2000 in cooperation with the European Commission:
 - (a) Fourteenth international intercalibration course for central and eastern Europe held in Gohrisch (Germany);
 - (b) Twelfth international intercalibration course for Mediterranean countries held in Crikvenica (Croatia);
 - (c) Fifth international intercalibration course for northern European countries held in Luleå (Sweden).
6. Following the decisions of the Working Group on Effects at its eighteenth session, the Programme Coordinating Centre posted a presentation of ICP Forests on the Internet. The presentation focuses on the aims, monitoring activities, main results and the structure of the programme. The most important papers are available for downloading.

7. At the sixteenth meeting of the Programme Task Force, Mr. E. Wermann retired as chairman of ICP Forests. The Task Force elected Mr. T. Haußmann (Germany) as its new chairman and requested the Working Group on Effects to take note of it.

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/tasks related to the programme's present objectives

- (a) First Intercalibration Course for Ozone Injury (Spain);
- (b) Meeting of the Expert Panel on Increment (Switzerland);
- (c) Meeting of the Expert Panel on Ground Vegetation (Norway);
- (d) Meeting of the ad hoc Working Group on Soil Solution (Finland);
- (e) Combined Meeting of the Expert Panels on Phenology and Meteorology (Portugal);
- (f) Meeting of the ad hoc Working Group on Litterfall (France);
- (g) Meeting of the ad hoc Working Group on Phytopathology (Belgium);
- (h) Publication of the 2000 Forest Condition Report (technical and executive versions);
- (i) Publication of the Overview Report on Multivariate Statistics within Integrated Studies on Tree Crown Condition in Europe;
- (j) Integrated Studies on level I and level II data by the Forest Soil Coordinating Centre (FSCC) (Ghent, Belgium) and the Programme Coordinating Centre (PCC) (Hamburg, Germany);
- (k) Drafting of the 2001 Forest Condition Report (technical and executive versions).

B. Activities/tasks aimed at further developing the programme

- (a) Implementation of level III in cooperation with ICP Integrated Monitoring;
- (b) Compilation of a cause-effect report based on the results of core plots of ICP Integrated Monitoring and ICP Forests;
- (c) Further development of possible links between levels I and II;
- (d) Further development of the data bank system at PCC.

C. Activities/tasks to be carried out in close cooperation with other ICPs

- (a) Preparation of a contribution to the substantive report on the occurrence, movement and effects of selected heavy metals.

III. RELEVANT DOCUMENTS AND REPORTS

- (a) Internal review of ICP Forests;
- (b) Strategy for the period 2001-2006;
- (c) Forest Condition in Europe (Executive Report);
- (d) Forest Condition in Europe (Technical Report Level I);
- (e) Intensive Monitoring of Forest Ecosystems in Europe (Technical Report Level II);
- (f) Multivariate Statistics within Integrated Studies on Tree Crown Condition in Europe.

Annex II

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL COOPERATIVE PROGRAMME ON ASSESSMENT AND MONITORING OF ACIDIFICATION OF RIVERS AND LAKES (ICP WATERS)

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON EFFECTS

1. The fifteenth meeting of the Programme Task Force, held in Pallanza (Italy) from 6 to 8 October 1999, was attended by 42 experts from 17 Parties to the Convention. At present 23 countries actively participate in the ICP Waters activities.
2. The Task Force considered two reports: (i) the draft twelve-year report of the programme; and (ii) the report on the workshop on biological assessment and monitoring, evaluation and models. The Task Force also considered the results of the chemical intercalibration in 1998, and reviewed the programme's ongoing activities and its future work-plan.
3. The aim of the twelve-year report is to provide an overall synthesis and assessment of data and information on water chemistry and biology, gathered by ICP Waters within the past 3 years (1996-98), and to relate them to previous findings. The report includes (i) an evaluation of the ICP Waters database; (ii) an assessment of the representativeness of ICP Waters monitoring sites; (iii) an evaluation of long-term trends in water chemistry at the individual ICP sites and on a regional scale; (iv) a characterization of invertebrates on a regional scale; and (v) an assessment of heavy metals.
4. The report on the workshop on biological assessment and monitoring, evaluation and models includes all presentations and a summary of the conclusions and recommendations. The workshop stressed the need for combining physico-chemical and biological monitoring. It also underlined the importance of sampling at fixed locations and at fixed times for minimizing "noise" in the database. The workshop noted that biological monitoring should include examination of all aspects of the biota and their interactions. It confirmed that a very good indication of the detrimental ecological effects, due to acidification, was obtained from studying the macroinvertebrate communities and fish in the context of critical loads. The need for more work to be done in assessing the critical loads for different regions (within a variety of water qualities) was highlighted.
5. The 1998 chemical intercalibration included two sets of samples used for the determination of: (i) major ions; and (ii) organic matter and aluminium fractions. 57 laboratories in 24 countries participated in the intercomparison exercise. More than 80% of the result pairs were acceptable for conductivity, chloride, sulphate, magnesium, sodium, and dissolved organic carbon. For pH, only 57% of the result pairs were acceptable even with the extended target accuracy of 0.2 units. Reactive and non-labile aluminium and nitrate+nitrite were excluded from the evaluation. It was stressed that normalization of the methods was necessary to improve the comparability for pH and

aluminium fractions. The next intercalibration exercise, planned for 2000, should also include heavy metals (Pb, Cd, Ni, Cu, Zn). Hg should also be included in the future intercalibrations.

6. Representatives of the ICP Waters Programme Centre actively participated at the ICP Integrated Monitoring and ICP Modelling and Mapping Task Force meetings, at the Workshop on effect-based approaches for heavy metals (Schwerin, Germany, October 1999), the Critical Loads Conference (Copenhagen, November 1999) and the Workshop on future needs for regional air pollution strategies (Saltsjöbaden, Sweden, April 2000).

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/task related to the programme's present objectives

- (a) Finalization of the twelve-year report;
- (b) Progress report on an in-depth assessment of nitrogen;
- (c) Summary of critical assessment of trends in intercalibration results;
- (d) Intercalibration of biota 2000;
- (e) Intercalibration of chemistry 2000;
- (f) Update of the ICP Waters Internet home page;
- (g) Amendment of the ICP Waters manual dealing with heavy metals;
- (h) Note on short-term climatic fluctuations (sea-salt episodes) and their influence on trends in water quality;
- (i) Collection and processing of 1999 data.

B. Activities/tasks aimed at further developing the programme

- (a) Further development of the international monitoring network to secure the necessary cover of relevant areas and adequate regional lake and river database;
- (b) Continued monitoring and assessment of heavy metals in surface waters;
- (c) Further implementation of the recommendations from the workshop on biological assessment and monitoring, evaluation and models;
- (d) Assessment of various possibilities for use of dynamic modelling in the ICP Waters activities;
- (e) Evaluation of possible contributions of ICP Waters to monitoring and assessing the impact of implementing the new Gothenburg Protocol.

C. Activities/tasks to be carried out in close cooperation with other ICPs

- (a) Participation in preparing the substantive report on the occurrence, movement and effects of selected heavy metals;
- (b) Contributing to the development of guidelines for applying dynamic modelling within effect-oriented activities;
- (c) Coordination of and/or participation in joint chemical and biological inter-laboratory comparison exercises.

III. LIST OF PUBLISHED DOCUMENTS AND REPORTS

Rosseland, B.O., Raddum, G.G. and Bowman, J. 1999. Workshop on biological assessment and monitoring; evaluation and models. NIVA-Report SNO 4091-99, ICP Waters Report 50/1999. ISBN 82-577-3698-8.

Hovind, H. 1999. Intercomparison 9913. pH, K_{25} , HCO_3 , $NO_3 + NO_2$, Cl, SO_4 , Ca, Mg, Na, K, total aluminium, aluminium - reactive and non-labile, TOC and COD-Mn. NIVA-Report SNO 4093-99, ICP Waters Report 51/1999. ISBN 82-577-3700-3.

Skjelkvåle, B. L., Andersen, T., Halvorsen, G. A., Raddum, G.G., Heegaard, E., Stoddard, J. L., and Wright, R. F. 2000. The 12-year report; Acidification of Surface Water in Europe and North America; Trends, biological recovery and heavy metals. NIVA-Report SNO 4208/2000, ICP Waters report 52/2000. ISBN 82-577-3827-1, 115 pp.

Stoddard, J. L., Jeffries, D. S., Lükewille, A., Clair, T. A., Dillon, P. J., Driscoll, C. T., Forsius, M., Johannessen, M., Kahl, J. S., Kellogg, J. H., Kemp, A., Mannio, J., Monteith, D., Murdoch, P. S., Patrick, S., Rebsdorf, A., Skjelkvåle, B. L., Stainton, M. P., Traaen, T. S., van Dam, H., Webster, K. E., Wieting, J., and Wilander, A. 1999. Regional trends in aquatic recovery from acidification in North America and Europe 1980-95. *Nature* 401: 575-578.

WGE, 1999. Trends in Impacts of Long-range Transboundary Air Pollution. Report form ITE, Huntingdon, United Kingdom ISPB 1 870393 52 X.

Skjelkvåle, B.L. 1999. Review of available databases and possible input from ICP Waters. In: Workshop on Effects-based approaches for heavy metals Schwerin, Germany, 1999 Proceedings Umweltbundesamt 87/99, Berlin.

Note: The references have been reproduced as received by the secretariat.

Annex III

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL COOPERATIVE PROGRAMME ON EFFECTS OF AIR POLLUTION ON MATERIALS, INCLUDING HISTORIC AND CULTURAL MONUMENTS (ICP MATERIALS)

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON EFFECTS

1. The sixteenth meeting of the Programme Task Force was held in Paris from 11 to 13 May 2000. The Task Force reviewed and assessed the results from the multipollutant exposure programme and discussed the possibilities for extending it to include new materials and environmental parameters. The Task Force also considered the possible use of the programme's data for modelling, mapping and calculating costs of corrosion damage.

2. The programme further developed its activities on the use of derived dose-response functions for mapping of areas with elevated risk of deterioration of materials and of calculation of corrosion costs. It also finalized preparations for the Workshop on mapping air pollution effects on materials, including stock at risk, organized in collaboration with ICP on Modelling and Mapping (14-16 June 2000, Stockholm).

3. The specimens in the multi-pollutant programme were withdrawn in autumn 1999 after 2 years of exposure and evaluated.

4. The Main Research Centre prepared a draft of the ICP Materials presentation on the Internet.

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/tasks related to the programme's present objectives

(a) Coordination of the programme including preparations for the seventeenth meeting of the Programme Task Force in 2001;

(b) Preparation of reports on the evaluation of corrosion effects after 1 and 2 years of exposure in the multi-pollutant programme (carbon steel, zinc, copper/bronze, limestone and painted steel);

(c) Preparation of an updated report on trends in corrosion of carbon steel and zinc (including results until 1997);

(d) Development of a database of environmental data for the multi-pollutant exposure programme including the preparation of an environmental data report for the period November 1998 to October 1999;

(e) Exposure of carbon steel, zinc and limestone for trend exposures (autumn 2000);

(f) Preparation of a brochure for the general public on the most significant results from the original programme;

(g) Finalization of the ICP Materials presentation on the Internet.

B. Activities/tasks aimed at further developing the programme

(a) Drawing-up plans for the inclusion of additional measurements of HNO₃ and particulates in order to assess their effects in the multi-pollutant situation.

C. Activities/tasks to be carried out in close collaboration with other ICPs

(a) In cooperation with ICP on Modelling and Mapping, the preparation of a publication of the proceedings from the Workshop on mapping air pollution effects on materials, including stock at risk;

(b) Preparation of a contribution to the substantive report on the occurrence, movement and effects of selected heavy metals.

III. LIST OF DOCUMENTS AND REPORTS

J. Tidblad, V. Kucera, A. A. Mikhailov, J. Henriksen, K. Kreislova, T. Yates, B. Stöckle and M. Schreiner, "Final dose-response functions and trend analysis from the UN ECE project on the effects of acid deposition.", Proc. 14th Int. Corros. Congr., Cape Town, South Africa, 1999.

J. Tidblad, A. A. Mikhailov and V. Kucera, "A model for calculation of time of wetness using relative humidity and temperature data.", Proc. 14th Int. Corros. Congr., Cape Town, South Africa, 1999.

J. F. Henrikssen and K. Arnesen. Report No 34. Environmental data report September 1995 to October 1998. Norwegian Institute for Air Research (NILU), Kjeller, Norway, 2000.

Report No 35. Results from the multipollutant programme: Corrosion attack on carbon steel after 1 and 2 years of exposure (1997-1999), draft.

Report No 36. Results from the multipollutant programme: Corrosion attack on zinc after 1 and 2 years of exposure (1997-1999), draft.

Report No 37. Results from the multipollutant programme: Corrosion attack on copper and bronze after 1 and 2 years of exposure (1997-1999), draft.

Report No 38. Results from the multipollutant programme: Corrosion attack on limestone after 1 and 2 years of exposure (1997-1999), draft.

Report No 39. Results from the multipollutant programme: Corrosion attack on painted steel after 1 and 2 years of exposure (1997-1999), draft.

Note: The references have been reproduced as received by the secretariat.

Annex IV

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL COOPERATIVE PROGRAMME ON EFFECTS OF AIR POLLUTION AND OTHER STRESSES ON CROPS AND NON-WOOD PLANTS (ICP VEGETATION)

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON EFFECTS

1. The thirteenth Task Force Meeting of ICP Vegetation took place in Semmering (Austria) in January 2000. Participants from 12 countries presented results, discussion papers and posters on the responses of crops and natural vegetation to ozone, ozone fluxes to vegetation, modelling and mapping of ozone concentrations and exceedences, and deposition of heavy metals to vegetation.
2. In 1999, ozone and climatic conditions, and the impacts of ambient ozone episodes on sensitive species of vegetation were monitored at 38 sites in 17 countries. The ratio of the biomass of ozone-sensitive to ozone-resistant clones of white clover was determined at each of the sites for four- to six-monthly harvests. The data were subjected to a quality assurance assessment, and then used to develop a level II predictive model of the modifying influence of climate and other pollutants on the response to ozone.
3. Data from 1999 have been added to the ICP Vegetation climate and pollutant database. The database has been structured in a format that is easily accessible to participants in the programme and is now available from the Coordination Centre on CD-ROM.
4. Published experimental data on the yield responses of several crops to ozone have been evaluated to develop 'stocks-at-risk' information for use in an economic assessment of crop losses due to ozone. A series of dose-response functions have been developed. They allow the relative sensitivity to be identified.
5. The collation of data on the sensitivity of natural vegetation species to ozone has continued. Several participants now contribute to the newly established BIOSTRESS project (Biodiversity in Herbaceous Semi-natural Ecosystems Under Stress by Global Change Components). The results from BIOSTRESS, which has a large component on the ozone effects on natural vegetation, will be reported to ICP Vegetation.
6. Samples of clover and soil substrate from the 1998 season have been analysed further for lead, cadmium, arsenic and copper content to determine those areas where there is significant deposition to crop species. Plans for the transfer of the "Heavy Metals in Mosses" project to ICP Vegetation have been made.
7. A Web page has been set up by the Coordination Centre. It describes the work of ICP Vegetation (<http://www.nmw.ac.uk/ITE/bang/ICPVegetation/index.htm>).

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/tasks related to the programme's present objectives

(a) The effects of ambient ozone on ozone-sensitive and ozone-resistant clones of clover will continue to be monitored in 2000, allowing the further expansion of ICP Vegetation database. This year, data on the stomatal conductance of the clover clones will be also collected for use in the development of a flux-effect model. Conductance will be related to ozone conditions and will be used to estimate the instantaneous flux of ozone into the plants. By using methods for accumulating fluxes, the critical flux for effects of ozone on visible injury development and biomass will be determined;

(b) Collection of data on the effects of ozone on natural vegetation will continue in 2000/2001. Field surveys for injury in natural communities will be conducted together with ozone-exposure experiments at some sites;

(c) Measurements of the deposition of heavy metals to the clover clones will be repeated in 2000. A relationship between biomass and leaf area will be determined for use in the calculation of heavy metal deposition rates. The "Heavy Metals in Mosses" programme will be formally transferred to ICP Vegetation on 1 April 2001. Data from the 2000 survey will be collated and analysed at the ICP Vegetation Coordination Centre.

B. Activities/tasks aimed at further developing the programme

(a) In the 2000 season, for the first time, the sensitive and resistant clover clones will be grown directly in the soil at some sites in addition to the usual pot experiment. Experience from this pilot study will be used to develop a protocol for field-grown clover. By growing the plants directly in the soil, it will be possible to use the data to verify the level I long-term critical level for biomass/yield reduction and to identify and quantify the relative importance of modifying (level II) factors.

C. Activities/tasks to be carried out in close collaboration with other ICPs

(a) Collaboration with ICP Modelling and Mapping in the development of level II maps for ozone and maps of crop losses due to ozone will continue. New collaboration on heavy metal deposition is expected. Sharing of methods for determining ozone effects on vegetation with ICP Integrated Monitoring and ICP Forests will continue in 2000/2001.

III. PUBLISHED DOCUMENTS AND REPORTS

Reports

Annual Status Report for the ICP-Vegetation (September 1999 - August 2000). ICP Vegetation Coordination Centre, Centre for Ecology and Hydrology, Bangor Research Unit, United Kingdom.

Technical Report: A summary report on the progress in investigation of heavy metal deposition to vegetation. Prepared for the Nineteenth Session of the Working Group on Effects, August, 2000.

UN/ECE (2000) ICP Vegetation Experimental Protocol for 2000. ICP Vegetation Coordination Centre, Institute of Terrestrial Ecology, Bangor Research Unit, United Kingdom.

UN/ECE (2000) Joint Report of the International Cooperative Programmes.

Scientific papers

Ball, G., Palmer-Brown, D., Fuhrer, J., Skärby, L., Gimeno, B.S. and Mills, G. Identification of non-linear influences on the seasonal ozone dose response of sensitive and resistant clover clones using artificial neural networks. Accepted by Ecological Modelling.

Benton J., Fuhrer, J., Gimeno, B.S., Skärby, L., Palmer-Brown, D., Ball, G., Roadknight, C. and Mills, G. (2000) An International Cooperative Programme indicates the widespread occurrence of injury on crops caused by ambient ozone episodes in Europe. Agriculture, Ecosystems and Environment 78: 19-30.

Bungener, P., Ball, G.R., Nussbaum, S., Geissmann, M., Grub, A. and Fuhrer, J. (1999). Leaf injury characteristics of grassland species exposed to ozone related to soil moisture condition and vapour pressure deficit. New Phytologist 142: 271-282.

Fumagalli, I., Gimeno, B.S., Velissariou, D., De Temmerman, L. and Mills, G. Evidence of ozone-induced adverse effects on Mediterranean crops. Submitted to Atmospheric Environment.

Mills, G., Ball, G.R., Hayes, F., Fuhrer, J., Skärby, L., Gimeno, B., De Temmerman, L. and Heagle, A., and members of the ICP Vegetation programme. Development of a multi-factor model for predicting the effects of ambient ozone on the biomass of white clover. Accepted by Environmental Pollution.

Soja, G., Vandermeiren, K., Pleijel, H. and Mills, G. Phenological weighting of ozone exposures in the calculation of critical levels for non-woody species. Accepted by Environmental Pollution.

Ball, G., Palmer-Brown, D. and Mills, G.E. A comparison of artificial neural network and conventional statistical techniques for analyzing environmental data. Chapter 14 in: Artificial Neural Networks Eds S. Lek and J.F. Guigan, Springer Verlag, 2000.

Mills, G.E. and Ball, G.R. The Role of the ICP-Crops in establishing the short-term critical level for ozone injury. In: Effects of Long-Range Transboundary Air Pollution, Air Pollution Studies 14, United Nations, 1999. 9–14.

Note: The references have been reproduced as received by the secretariat.

Annex V

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL COOPERATIVE PROGRAMME ON INTEGRATED MONITORING OF AIR POLLUTION EFFECTS ON ECOSYSTEMS (ICP INTEGRATED MONITORING)

- I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON EFFECTS
1. The eighth meeting of the Programme Task Force on ICP Integrated Monitoring was held in Vilnius from 4 to 6 May 2000. A one-day workshop of ICP Integrated Monitoring was held prior to the Task Force meeting.
 2. In autumn 1999 the National Focal Points (NFPs) reported their 1998 results to the ICP Integrated Monitoring Programme Centre. The Programme Centre carried out standard checks on the results and incorporated them into the programme's database. The Programme Centre also developed new software for reporting 1999 data according to the new ICP Integrated Monitoring Manual.
 3. The programme further developed its activities in close cooperation with NFPs, in particular in the following four priority areas:
 - (a) Calculation of pools and fluxes of heavy metals at selected sites (led by NFP of Sweden);
 - (b) Assessment of cause-effects relationships for biological data, particularly on vegetation (led by NFP of the Netherlands);
 - (c) Calculation of fluxes and trends of S and N compounds, base cations and H⁺ (led by the Programme Centre);
 - (d) Dynamic modelling (led by NFP of the United Kingdom, in cooperation with the Programme Centre).
 4. Participants of ICP Integrated Monitoring programme took part in the "Needle Leaf Interlaboratory Comparison" organized by ICP Forests.
 5. The Manager of the ICP Integrated Monitoring Programme Centre (Mr. M. Forsius) participated in an evaluation project of the Integrated Monitoring programme carried out in the Baltic countries. The project has been funded by the Nordic Council of Ministers, and the main aim was to assess the benefits of the investments of the Council in establishing integrated monitoring in these countries. Mr. M. Starr (Finland) was the project leader and Mr. S. Bråkenhielm (Sweden) was the third member of the evaluation team. The evaluation report will be available in autumn 2000.
 6. A representative of the Programme Centre and the programme's NFPs actively participated at the conference "Critical Loads Copenhagen 1999" primarily devoted to discussions of possible new concepts for calculating and mapping critical loads for ecosystems. The Programme Centre

was also represented at the Workshop on Effect-based Approach for Heavy metals, (Schwerin, Germany, October 1999), and at the meetings of the Task Forces on ICP Modelling and Mapping and ICP Waters.

7. The Programme Centre continued its participation in the EU project “Networking of Long-term Integrated Monitoring in Terrestrial Systems (NoLIMITS)”, contributed to the building of a pilot meta-database of sites, and was represented in the NoLIMITS Task Force. While the NoLIMITS project ended in January 2000, as a follow-up the Programme Centre participated in preparing a new project proposal for the fifth framework programme of the European Union “Towards Integrated Monitoring in Europe for the Global Terrestrial Observing System (TIMEforGTOS)”.

8. The Programme Centre produced the Ninth Annual Report 2000 and compiled a new ICP Integrated Monitoring brochure.

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/tasks related to the programme’s present objectives

(a) Maintenance and development of a central ICP Integrated Monitoring database at the Programme Centre;

(b) Participation in inter-laboratory comparisons organized by other ICPs;

(c) Inclusion of quality-controlled national data for 1999 in the new ICP Integrated Monitoring database;

(d) Processing of additional information (background information/site descriptions) for detailed assessments (e.g. dynamic modelling);

(e) Continuation of scientific work in the agreed four priority areas according to approved scientific strategies:

(i) Calculation of concentrations, pools and fluxes of heavy metals at selected sites;

(ii) Assessment of cause-effect relationships for biological data (particularly vegetation);

(iii) Assessment of pools, fluxes and trends of S and N compounds, base cations and H⁺;

(iv) Site-specific dynamic modelling and impact scenario assessment.

B. Activities/tasks aimed at further developing the programme

(a) Participation in the activities of external organizations (Global Terrestrial Observing System, TIMEforGTOS project, International Long Term Ecological Research Network (ILTER), European Environment Agency).

C. Activities/tasks to be carried out in close collaboration with other ICPs

(a) Coordination of work and cooperation with other ICPs, particularly regarding dynamic modelling (all ICPs), cause-effect relationships in terrestrial systems (ICP Forests, ICP Vegetation), and surface waters (ICP Waters);

- (b) Investigation of possibilities for carrying out a joint assessment of the vegetation part of the ICP Integrated Monitoring and ICP Forests level II databases;
- (c) Compilation of a report on cause-effect relationships in forest ecosystems, based on published information (to be coordinated by ICP Forests).

III. PUBLISHED DOCUMENTS AND REPORTS

Programme's annual report

Kleemola, S. and Forsius, M. (eds.) 2000. International Co-operative Programme on Integrated Monitoring of Air Pollutant Effects on Ecosystems. 9th Annual Report. Finnish Environment Institute, Helsinki. The Finnish Environment (in press).

Evaluations of international ICP Integrated Monitoring data

Stoddard, J.L., Jeffries, D.S., Lükewille, A., Clair, T.A., Dillon, P.J., Driscoll, C.T., Forsius, M., Johannessen, M., Kahl, J.S., Kellogg, J.H., Kemp, A., Mannio, J., Monteith, D.T., Murdoch, P.S., Patrick, S., Rebsdorf, A., Skjelkvåle, B.L., Stainton, M.P., Traaen, T., Van Dam, H., Webster, K.E., Wieting, J. and Wilander, A. 1999. Regional trends in aquatic recovery from acidification in North America and Europe. *Nature* 401: 575-578 (main responsibility by ICP Waters).

Working Group on Effects 1999. Trends in Impacts of Long-Range Transboundary Air Pollution. Compiled by the International Cooperative Programmes of the Working Group on Effects, UN/ECE Convention on Long-range Transboundary Air Pollution. Centre for Ecology and Hydrology, United Kingdom. ISBN 1 870 393 52X. 81 p.

Other contributions by representatives of the Programme Centre

Løkke, H., Bak, J., Robbink, R., Bull, K., Curtis, C., Falkengren-Grerup, U., Forsius, M., Gundersen, P., Hornung, M., Skjelkvåle, B.L., Starr, M., and Tybirk, K. 2000. Critical Loads Copenhagen 1999. 21st-25th November 1999. Conference Report Prepared by Members of the Conference's Secretariat, the Scientific Committee and Chairmen and Rapporteurs of its Workshops in Consultation with the UN/ECE Secretariat. Critical Loads. National Environmental Research Institute, Denmark. 48pp. - Arbedsrapport fra DMU nr. 121.

Note: The references have been reproduced as received by the secretariat.

Annex VI

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE INTERNATIONAL
COOPERATIVE PROGRAMME ON MAPPING CRITICAL LEVELS AND LOADS
(ICP ON MODELLING AND MAPPING)

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON
EFFECTS

1. The European critical loads database has been used in the negotiations of the multi-effect, multi-pollutant Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, adopted in December 1999. The Mapping Programme produced a brochure related to the Protocol's annexes to illustrate the methods and data. The same database is being used in the negotiations of the European Union's directive on national emission ceilings. The Coordination Center for Effects (CCE) and National Focal Centres provided background information on critical loads to policy makers at national and international levels, and dealt with numerous questions and requests.
2. The Training Workshop on Critical Loads Calculations took place in Pushchino (Russian Federation) from 27 September to 1 October 1999, jointly sponsored by the Russian Federation and Germany. The Workshop mainly addressed participants from east European countries and aimed at providing methodological assistance for the participating NFCs.
3. The Workshop on Effects-based Approaches for Heavy Metals took place in Schwerin (Germany) from 12 to 15 October 1999. Its aim was to review new methodological developments, identify gaps in the scientific knowledge and steer future national and international research.
4. The Critical Loads Copenhagen Conference was held from 21 to 25 November 1999. 135 participants from 17 countries discussed the present state of scientific knowledge related to the used definition of critical loads, reviewed methodologies for calculating critical loads for acidification and eutrophication, and considered the possibilities for strengthening the relationship between calculated exceedances and the observed ecological effects in the field. Numerous conclusions and recommendations concerned, in particular: (i) the definition of critical loads; (ii) uncertainties in critical loads calculations; (iii) the further development and application of dynamic models; and (iv) the development and use of empirical critical loads (in addition to the mass balance critical loads), especially for nitrogen.
5. The sixteenth meeting of the Task Force, which, following the decision of the Executive Body at its seventeenth session, became the Task Force on ICP on Mapping Critical Levels and Loads, was held in Edinburgh (United Kingdom) from 5 to 7 April 2000. It was attended by 62 experts from 22 countries. The Task Force considered in particular: (i) the activities and decisions of the Executive Body and the Working Group on Effects relevant to the work of the programme; (ii) present cooperation with EMEP and other ICPs and its further development; (iii) the results of workshops and plans for future meetings; (iv) national activities concerning critical loads and levels (acidification, eutrophication, tropospheric ozone, heavy metals); (v) development and application

of dynamic modelling; (vi) the name, future scope, structure and objectives of the programme; and (vii) reporting of the programme's results.

6. Pursuant to the recommendation of the Executive Body (ECE/EB.AIR/68, para. 51 (e)), the Task Force discussed the possible changes to the name of the programme that would reflect its broader activities. The Task Force agreed to propose to the Working Group on Effects to change the name of the programme to ICP on Modelling and Mapping (in short form: ICP M&M).

7. Following the recommendation of the Schwerin workshop on heavy metals, the Task Force agreed to set up an ad hoc expert group on effect-based critical limits of heavy metals. The aim of the expert group will be to coordinate the further development and to harmonize the derivation of critical limits (which are prerequisites for making critical load estimates comparable between different countries).

8. The Task Force was of the opinion that most of the conclusions and recommendations of the Critical Loads Copenhagen Conference were already reflected in the present work of the programme and/or in its work-plan for the next year. While the Task Force opposed suggested changes in the definition of critical loads, it decided to set up an ad hoc drafting group to draw up guidelines on the use of empirical critical loads and to propose their inclusion into the mapping manual.

A. Activities related to the programme's present objectives

(a) Maintenance and updating of the database of critical loads of sulphur and nitrogen and of data derived from them;

(b) Development of methods and procedures (including dynamic modelling) for the assessment of (i) recovery; and (ii) risk of future damage;

(c) Further development of methods for the application and mapping of empirical critical loads, in particular for nitrogen;

(d) Development of methodologies for deriving critical limits/loads of heavy metals; organization of an ad hoc expert meeting (October 2000, Bratislava);

(e) Investigation of uncertainties and possible systematic biases in critical loads and critical loads exceedance calculations;

(f) Encouragement and support of subregional workshops (to increase the participation of Mediterranean and east European countries in mapping activities and to share technical experience).

B. Activities/tasks aimed at further developing the programme

(a) Further development and broader application of dynamic modelling, aiming, *inter alia*, at: (i) providing information on trends in bio-geochemical parameters in EMEP grid cells as a function of change in emission situation; (ii) assisting in the assessment of Europe-wide scenario analysis; and (iii) contributing substantially to regional and subregional assessment of environmental damage and recovery;

(b) Further development of the effect-based approach, including the elaboration of risk assessment methodologies.

C. Activities/tasks to be carried out in close cooperation or jointly with other programmes

(a) Intensified cooperation between ICPs in the development and application of dynamic modelling, including organization of an expert meeting in autumn 2000 in Sweden;

(b) Collaboration with EMEP and other international and national bodies/organizations in harmonizing as far as possible land-cover and land-use data/maps and in performing joint studies on environmental indicators;

(c) Establishment of common procedures for mapping air pollution effects on materials using, *inter alia*, the results of the joint workshop with ICP Materials on mapping air pollution effects on materials, including stock at risk (June 2000, Stockholm);

(d) Preparation of a contribution to the substantive report on the occurrence, movement and effects of selected heavy metals.

III. PUBLISHED DOCUMENTS AND REPORTS

Posch M., 1998. Averaging and other simplifications in dynamic soil models. In: DIAE/CIEMAT (ed): Data Analysis for Modelling and Assessment of Biogeochemical Effects of Air Pollution in Temperate Ecosystems. Workshop Report, CIEMAT, Madrid, Spain, pp.61-67.

Henriksen A., M. Posch, 1998. Critical loads and their exceedances for ICP-Waters sites. ICP-Waters Report 44/1998. Norwegian Institute for Water Research, Oslo, Norway, 35 pp.

Kämäri J., K. Rankinen, L. Finér, S. Piirainen, M. Posch, 1998. Modelling the response of soil and runoff chemistry to forest harvesting in a low deposition area (Kangasvaara, eastern Finland). *Hydrology and Earth System Sciences* **2(4)**:485-495.

Posch M., P.A.M. de Smet, J.-P. Hettelingh, R.J. Downing (eds), 1999. Calculation and Mapping of Critical Thresholds in Europe. Status Report 1999, Coordination Center for Effects, National Institute of Public Health and the Environment (RIVM), Bilthoven, Netherlands, iv+165 pp.

Posch M., W. de Vries, 1999. Derivation of critical loads by steady-state and dynamic soil models. In: S.J. Langan (ed): The Impact of Nitrogen Deposition on Natural and Semi-Natural Ecosystems. Kluwer Academic Publishers, Dordrecht, Netherlands, pp. 213-234.

Posch M., J. Fuhrer, 1999. Mapping level-II exceedance of ozone critical levels for crops on a European scale: The use of correction factors. In: J. Fuhrer, B. Achermann (eds): Critical Levels for Ozone – Level II. Environmental Documentation No.115, Swiss Agency for Environment, Forest and Landscape, Bern, Switzerland, pp.49-53.

Mayerhofer P., J. Alcamo, J.G. van Minnen, M. Posch, R. Guardans, B.S. Gimeno, T. van Harmelen, J. Bakker, 2000. Regional air pollution and climate change in Europe: An integrated analysis (AIR-

CLIM). Progress Report 2, Center for Environmental Systems Research, University of Kassel, Germany, 59 pp.

Hindar A., M. Posch, A. Henriksen, J. Gunn, E. Snucins, 2000. Development and application of the FAB model to calculate critical loads of S and N for lakes in the Killarney Provincial Park (Ontario, Canada). Report 4202-2000, Norwegian Institute for Water Research, Oslo, Norway, 41 pp.

Bashkin V., H.-D. Gregor (eds.), 1999. Proceedings of Second Training Workshop on the calculation and mapping of critical loads for air pollutions relevant to the UN/ECE Convention on long-range Transboundary air pollution, Institute of Basic Biological Problems RAS, Pushchino, Russian Federation 27 Sep.- 2 Oct. 1999, 132 pp.

Gregor H.-D., B. Mohaupt-Jahr, F. Hönerbach (eds.), 1999. Proceedings Workshop on Effects-Based Approaches for Heavy Metals, Schwerin , Germany 12 -15 Oct. 1999, 157 pp.

Note: The references have been reproduced as received by the secretariat.

Annex VII

REVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE TASK FORCE ON THE HEALTH ASPECTS OF AIR POLLUTION

I. ACTIVITIES SINCE THE EIGHTEENTH SESSION OF THE WORKING GROUP ON EFFECTS

1. The report on Health Risk of Particulate Matter from Long-range Transboundary Air Pollution; Preliminary Assessment prepared by the Task Force on the Health Aspect of Air Pollution was published by the WHO European Centre for Environment and Health and made available at the seventeenth session of the Executive Body for the Convention.
2. The third meeting of the Task Force on the Health Aspects of Air Pollution took place in Bilthoven, Netherlands, from 8 to 10 May 2000. The meeting was attended by 18 experts representing 12 countries, the European Commission and the WHO/Regional Office for Europe.
3. Pursuant to the decision of the Working Group on Effects on its eighteenth session and the Executive Body's work-plan for the implementation of the Convention, the Task Force considered the possible health effects of selected heavy metals and persistent organic pollutants (for details see EB.AIR/WG.1/2000/12).
4. The Task Force in particular: (i) reviewed the available data on concentrations of cadmium, lead and mercury in air; (ii) assessed the relevance of the various routes of human exposure to heavy metals, in particular the contribution of the long-range transport of air pollutants; and (iii) evaluated the human health risk of exposure to cadmium, lead and mercury from long-range transport. The Task Force established an editorial group for drafting the chapter reviewing the health risk of heavy metals from the long-range transport of air pollution for the substantive report on the "Occurrence, movement and effects of selected heavy metals", to be prepared by the Working Group on Effects.
5. While addressing issues related to the health aspects of POPs, the Task Force: (i) selected priority POPs for further action from those substances included in the current Protocol; (ii) identified future actions that it could take to address the health effects from the long-range transport of the selected POPs; and (iii) identified candidate POPs for possible future inclusion in the Protocol.

II. ACTIVITIES AND TASKS PLANNED FOR 2000/2001

A. Activities/tasks related to the Task Force's present objectives

- (a) Continuing assessment of new information on the health risk of particulate matter with emphasis on the contribution from the long-range transport of air pollution;
- (b) Assessment of the health risk of (i) heavy metals; and (ii) selected POPs from the long-range transport of air pollution.

B. Activities/tasks aimed at further developing the Task Force's work

(a) Assistance in developing appropriate criteria for particulate matter for use in integrated assessment modelling.

C. Activities/tasks to be carried out in close cooperation or jointly with other programmes

(a) Preparation of a contribution to the substantive report on the "Occurrence, movement and effects of selected heavy metals".

III. PUBLISHED REPORT

Health Risk of Particulate Matter from Long-range Transboundary Air Pollution; Preliminary Assessment prepared by the Joint WHO/UNECE Task Force on the Health Aspects of Air Pollution, WHO, 1999.

Note: The reference has been reproduced as received by the secretariat.