CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION (LRTAP)

WORKING GROUP ON EFFECTS (WGE)

INTERNATIONAL COOPERATIVE PROGRAMME ON EFFECTS OF AIR POLLUTION ON NATURAL VEGETATION AND CROPS (ICP VEGETATION)

Minutes of the 35th Task Force Meeting

The 35th meeting of the Programme Task Force was held online from 21-23 February, and hosted by the Coordination Centre, at the UK Centre for Ecology & Hydrology.

1. The meeting was attended by 135 participants from 36 countries. Participation included representatives of EMEP/MSC-West, EMEP/MSC-East, ICP Forests, ICP Integrated Monitoring, the Coordination Centre for Effects (CCE) of the ICP Modelling and Mapping, in addition to the Chair of the Working Group on Effects and the UNECE Secretariat of the LRTAP Convention.

2. A brief welcome address was given by Ms. Felicity Hayes (UK), Chair of ICP Vegetation, noting that this online meeting gave opportunities for attendance by representatives of countries participating in outreach work of the ICP Vegetation, in addition to those participating as representatives of countries covered by the UNECE region.

3. Mr. Krzysztof Olendrzynski (UNECE Secretariat) and Ms. Isaura Rabago (Spain), Chair of WGE, gave an overview of recent developments in the Air Convention, and reported on progress with the amended Gothenburg Protocol Review and the next steps of the process. The ICP Vegetation will be contributing directly to the amended Gothenburg Protocol Review, to the specific questions 'Progress made towards achieving the environmental and health objectives' and 'Adequacy of obligations in attaining the environmental and health objectives'.

4. Ms. Sophie Standring (UK) gave an update on the new Forum for International Cooperation on Air Pollution (FICAP), which is a new Task Force established to promote international collaboration towards preventing and reducing air pollution in improve air quality globally, and which is co-chaired by the UK and Sweden. Information was presented on the proposed first meeting of the Task Force in the UK in October 2022, and the first broader meeting of the Forum in Sweden in spring 2023. Information was sought from participants on key documents and information to prioritise for translation.

5. Ms. Felicity Hayes (UK), Chair of ICP Vegetation, gave an overview of the activities and achievements of the ICP Vegetation in 2021 and reported on progress with items included in the workplan of the LRTAP Convention. Important activities and deliverables included:

- Contributions to the review of the Gothenburg Protocol.
- Preparation of 'Ozone Injury Guides' to facilitate ozone damage monitoring for NECD and aligned ecosystem monitoring schemes.
- Progress with additional chapters to Scientific Background Document B, including a recommendation for inclusion of a chapter on sweet potato, was presented later in the meeting.
- Contributions of ICP Vegetation participants to the Revision of Empirical Critical Loads for Nitrogen (led by the CCE).
- Outreach activities beyond the UNECE region, including: maps of predicted impacts on crop yield in sub-Saharan Africa, where it was estimated that large production losses of bean could occur in East Africa and additional countries including Benin, Togo and Ghana; measurements of ozone concentration in some countries outside the UNECE region, which included 28-day mean ozone concentrations of up to 62 ppb in some parts of India; results of a literature study into the yield benefits of air filtration, which showed yield increases of 2-60% depending on the country and crop; an online course and youtube video release on 'ozone and tropical agriculture'.
- Results of fine-resolution modelling of mercury deposition in the UK, showing localised hotspots of deposition around point sources.
- The current moss survey, from 2020-2022 (extended for 1 year due to Covid-19 restrictions on fieldwork in some countries) and includes a pilot study on mosses as biomonitors of microplastics as an indication of atmospheric deposition, in addition to content of metals, N and POPs. Further details of progress with the 2020-2022 survey were given later by Ms. Marina Frontasyeva (Russian Federation).
- Update of the ICP Vegetation website (https://icpvegetation.ceh.ac.uk).

6. Ms. Marina Frontasyeva (Russian Federation) gave an overview of the moss sampling campaign from countries that had collected samples in 2020 and 2021, including a GIS map of sampling sites for total samples and maps for individual countries. The first European moss survey was conducted in 1990 and has been repeated every five years since. Despite difficult conditions due to the global pandemic, moss collection was undertaken in 2020/21 in many European countries and in some Asian ones as well. >3200 moss samples were already collected in 2020/2021 (compared to the ~5000 samples of the 2015/16 campaign), from a total of 26 countries. Additional countries will collect their samples in 2022.

7. Mr. Ilia Ilyn (Russian Federation) presented an analysis of heavy metal pollution trends in the EMEP region, using atmospheric modelling and the results of previous moss surveys. Combined usage of the results of biomonitoring, atmospheric modelling and EMEP monitoring allows the investigation of long-term HM (Pb, Cd, Hg, Cu) and POP pollution changes in particular countries as well as at local scale. Results of modelling and biomonitoring demonstrated similar rates of Pb, Cd and Hg reduction in most of the EMEP countries. The data for Cu needs further investigation as there was high temporal variability in the EMEP measurements. For POPs, observations at the EMEP monitoring stations and modelling results demonstrated a declining trend for BDE-99 and minor changes for PCB-153. For B(a)P and HCB the changes between modelled

and the observed values were contrasting. A dense moss-sampling network was also found to provide a more reliable estimate of long-term changes at local spatial scale.

8. Ms. Anne-Katrin Prescher (Germany, ICP Forests) gave an overview of recent ICP Forests activities and achievements, including the results of a survey of metal content of soils across Europe.

9. Mr. Thomas Scheuschner (CCE, Germany) presented an update on activities of the CCE. The CCE will be conducting a review of ammonia Critical Levels in 2022 and 2023, including workshops to which interested members of the ICP Vegetation were invited to contribute. The first workshop will take place on 28th – 29th March 2022, and will be organised by Markus Geupel (UBA, Germany).

10. Mr. Alexander Uzhinskiy presented the Moss Survey Data Management System, which is recommended for use by the moss survey participants. It includes the possibility to directly record GPS location and photos from the moss collection sites using an App.

11. Additional announcements were made to the participants of the ICP Vegetation, including: an introduction to the new IM PCC by Mr. Kurén Weldon; the upcoming review of NOx Critical Levels by the ICP Vegetation PCC (Mr. Mike Perring); a Europe-wide survey and methods comparison for identifying microplastics in mosses (Mr. Julian Aherne, Canada and Ms. Felicity Hayes, UK).

12. The following four sessions considered the ozone and moss survey sub-programmes, and also included a session dedicated to nitrogen impacts on vegetation. The topics of the oral presentations are provided in Annex III. For further details of the content of the oral presentations we refer to the book of abstracts and copies of the presentations available on the ICP Vegetation web site (http://icpvegetation.ceh.ac.uk). In addition, 14 posters were presented during the meeting, covering similar topics as the oral presentations.

13. At the end of the ozone and moss survey specific sessions, conclusions and recommendations were presented, discussed and adopted by the Task Force as described in Annex I. The medium-term workplan was reviewed and agreed and adopted by the Task Force (see Annex II). Ms. Hayes (UK) drew attention to various workshops and conferences in 2022. The Task Force took note of the offer from Lithuania to host the 36th Task Force Meeting at the Institute of Forestry, Lithuanian Research Centre for Agriculture and Forestry in Girionys (Kaunus district), provisionally in February 2023. The Task Force took note of a provisional offer from Albania to host the meeting in 2024.

14. On behalf of the Task Force, Ms. Hayes (UK) closed the meeting by thanking the colleagues at the PCC for supporting and hosting the meeting. Ms. Hayes acknowledged the UK Department for Environment, Food and Rural Affairs (Defra) and the United Nations Economic Commission for Europe (UNECE) for their continuous financial support of the ICP Vegetation Coordination Centre. Ms. Hayes thanked the participants of the ICP Vegetation for their valuable contributions to the programme.

Annex I. Decisions and recommendations by the Task Force of the ICP Vegetation at its 35th meeting, 21-23 February 2022, Online, PCC. *Workplan items for 2022-2023 are included in Annex II.*

OZONE RELATED ACTIVITIES:

- The Task Force (TF) took note of progress with the workplan item on 'Improving and validating soil moisture index in the EMEP model' and acknowledged the efforts of CIEMAT (Madrid, Spain) to coordinate this work in collaboration with EMEP/MSC-West.

- The TF took note of progress with the development of new chapters for Scientific Background Document B (SBD-B), associated with Chapter 3 of the Modelling and Mapping Manual of the LRTAP Convention. The table below provides an overview of the topics proposed for inclusion, who is taking the lead and who is going to contribute (subject to available funding).

Topic	Lead	Contributions
Guidelines for assessing ozone-induced foliar damage and yield loss of horticultural crops	Ignacio González Fernández and Victoria Bermejo (Spain)	Vicent Calatayud (Spain), Giacomo Gerosa and Riccardo Marzuoli (Italy)
Impacts of ozone on pasture quality	Felicity Hayes (Coordination Centre, UK), Ignacio González Fernández (Spain)	
Ozone flux-effect relationships and methodology for net annual increment (NAI) of trees	Lisa Emberson (UK)	Sabine Braun (Switzerland), Per Erik Karlsson (Sweden)
Ozone removal by vegetation in urban areas	Lina Fusaro and Fausto Manes (Italy)	Rocio Alonso (Spain), Pierre Sicard (France), Giacomo Gerosa (Italy)
Validation of soil moisture index used in EMEP model	Ignacio González Fernández (Spain)	Sabine Braun (Switzerland), Vicent Calatayud and Arnaud Carrara (Spain), Giacomo Gerosa and Riccardo Marzuoli (Italy), Lisa Emberson (UK), Per Erik Karlsson (Sweden), David Simpson (Sweden, EMEP/MSC-West)
Ozone-induced injury guidance for educational and awareness raising purposes	Klaudia Borowiak (Poland)	Felicity Hayes (UK), Felix Leung (Hong Kong, China), Vicent Calatayud and Victoria Bermejo (Spain)
Critical levels for ozone-sensitive clones of poplar	Yasutomo Hoshika (Italy)	Vicent Calatayud (Spain), Riccardo Marzuoli (Italy), Pierre Sicard (France)
Ozone impacts on insects	Valda Araminiene (Lithuania)	Coordination Centre (UK)
Improved phenology for ozone flux modelling in trees	Sabine Braun (Switzerland)	Per Erik Karlsson (Sweden)
Interactive impacts of ozone and nitrogen on (semi-)natural vegetation	Felicity Hayes (Coordination Centre, UK),	

- The TF agreed to the inclusion of a chapter on sweet potato for Scientific Background Document B, noting that sweet potato is grown in some regions of Europe as well as in tropical regions.

- The TF took note of the roadmap for the review and revision of the Critical Levels for ammonia, presented by the Coordination Centre for Effects (CCE) of the ICP Modelling

and Mapping. The TF welcomed the opportunity for experts within the ICP Vegetation to contribute to the review.

- The TF took note of the ongoing collaboration between ICP Vegetation and EMEP Task Forces and Centres and encouraged to continue such collaboration as described in further detail of the workplan of the ICP Vegetation (Annex II).

- The TF took note of the outreach activities of the ICP Vegetation and encouraged to continue such activities, especially in developing regions. The TF encouraged further collaboration with international scientific networks at the global scale.

- The TF agreed to the inclusion in the future meetings of a session focused on nitrogen impacts on vegetation to discuss methodologies and exchange results.

MOSS SURVEY RELATED ACTIVITIES:

- The TF reiterated the importance to participants of the 2020-22 moss survey to:
  - Sample mosses in agreement with the monitoring manual and recommended sampling in areas with a defined humus layer (where possible);
  - Conduct quality checks of data before submitting the final data to data management system (DMS), including data on moss reference material;
  - Make use of the many functionalities of the Data Management System, such as link to an App to upload metadata, conduct simple summary statistics and mapping of the data.
  - Remember that the focus of the LRTAP Convention is at rural sites, rather than at local point sources.

- The TF reiterated that quality checks of submitted data are the responsibility of the data provider. Subsequently, the Moss Survey Coordination Centre is tasked to check data for outliers, discuss any country border effects with respective data providers and agree with the data providers on the final data to be included in the DMS.

- The TF took note of the importance of avoiding collection of moss where there would be 'canopy drip' from trees and shrubs. In addition the TF took note that often managed grassland can be unsuitable for sampling mosses due to sparse occurrence of moss and that shoots may be less than three years old.

- The TF recommended the formation of a sub-group to review the metals and pollutants of focus for the 2025/6 survey, bearing in mind potential emerging pollutants, and to report back to the TF at the next meeting. The TF noted the following recommendations:
  - Heavy metals accumulation in mosses should continue to be measured, even though they have been decreasing since 1990. The decreases are not continuous for all elements, it is important to report stagnations and renewed increase, and even low accumulation can cause critical concentrations in ecosystems to be reached or exceeded.
  - Nitrogen must also continue to be measured, because in many countries nitrogen emission and related accumulation in mosses has been monitored at unchanged high levels since 2005, exceeding critical effect thresholds.

- POP measurements started since 2010 should be continued and could be part of the standard measurement program.
- Microplastics should be considered after the results of the pilot studies are known.

Annex II. Medium-term workplan (2022 – 2023) ICP Vegetation

Workplan items in *italics* are not specifically included in the biannual workplan of the LRTAP Convention for 2022 and 2023.

2022:

- Call for data for moss survey 2020-23 on heavy metals, nitrogen and POPs
- *Comparison of spatial patterns and temporal trends of heavy metals in mosses and EMEP-modelled deposition (with EMEP/MSC-East)*

2023:

- Ozone flux-based risk assessment for vegetation for air pollution scenarios relating to: (a) Implication on vegetation of scenarios focusing on the characterisation of the contribution of methane as an ozone precursor - post-hoc analysis (b) the application of ozone modified photosynthesis-based flux-response models c) the effects of drought under present and future climatic conditions (with EMEP/MSC-West, CIAM, TFMM and TFHTAP).
- Review of ozone pollution and climate change impacts on vegetation – focus on implications for calculation and application of flux-based Critical Levels and risk assessment.
- State-of-knowledge report on 'genetics of crop resilience to ozone and potential for crop breeding'.

- *Development of ozone critical levels for forest trees based on the net annual increment (NAI)*
- *Review Critical Levels for NOx.*
- *Joint workshops with ecosystem and crop modellers, including AgMIP-Ozone.*

Selected ongoing annual activities:

- *Review and update Scientific Background Document B for Chapter 3 of Modelling and Mapping Manual of LRTAP Convention*
- *Outreach and networking activities in developing regions, linking with other international networks*

Annex III. Programme of the 35th Task Force Meeting of the ICP Vegetation

Monday 21st February, 2022

Session: Plenary **Chair:** Felicity Hayes

14:00 *Felicity Hayes* – Opening and welcome

14:05 *Krzysztof Olendrzynski & Isaura Rabago* - Latest developments of the Convention

14:20 *Sophie Standring, Alison Davies & John Salter* – The Forum for International Cooperation on Air Pollution (FICAP)

14:40 *Felicity Hayes* - Overview of ICP Vegetation

15:00 *Marina Frontasyeva* – Moss Survey 2020-2021-2022. Sampling in Covid years of 2020 and 2021

15:20 ***General discussion***

15:30 ***Comfort break***

15:45 *Ilia Ilyin* - Analysis of heavy metal pollution trends in the EMEP region basing on results of atmospheric modelling and moss surveys

16:05 *Anne-Katrin Prescher* - Recent ICP Forests activities

16:25 *Thomas Scheuschner* - Update from CCE including review of ammonia Critical Levels

16:35 *Alexander Uzhinskiy* - Moss Survey Data Management System

16:45 ***Miscellaneous announcements, including: Introduction to the new IM PCC*** *(James Kurén Weldon)****, NOx Critical Levels Review*** *(Mike Perring)****, microplastics*** *(Julian Aherne)****, and general discussion*** *(Felicity Hayes)*

17:00 ***Session end***

Tuesday 22nd February, 2022

Session: Moss 1 **Chair:** Winfried Schröder

09:30 *Konstantine Vergel* – Moss biomonitoring of atmospheric pollution in the Moscow region

09:50 *Pranvera Lazo* - A pan-see biomonitoring network for the assessment of potentially toxic elements in urban air.

10:10 *Guntis Tabors* - Assessment of atmospheric pollution deposition in Latvia from 1990 to 2020 using the moss as absorbent

10:20 *Stefano Loppi* - Use of biomonitoring data in environmental forensics

10:40 *Mehriban Jafarova* - Assessing the atmospheric deposition of microplastics: A lichen biomonitoring study in the city of Milan, Italy

11:00 ***General discussion***

11:15 ***Comfort break***

Session: Moss 2 **Chair:** Antoaneta Ene

11:30 *Irena Pavlíková* - Monitoring of heavy metals and nitrogen concentrations in mosses in the vicinity of an integrated iron and steel plant: Case study in Czechia

11:50 *Michelle Nerentorp* - Metal and nitrogen concentrations in moss in Sweden – Results from the National Moss Survey 2020

12:00 *Winfried Schröder* – Canopy drip effect on concentrations of heavy metals in mosses sampled across north-west Germany as part of the European Moss Survey 2021

12:10 *Dinesh Kumar Saxena* - Trend of atmospheric metals by moss *Hypnum cupressiforme* Hedw. in Jammu (India)

12:30 *Sheyar Abdo* – Mapping the spatial distribution of (Na, Cl, Ca, Mg) over Kaliningrad Oblast (Russia) by using ArcGIS PRO 2.4

12:50 ***General discussion***

13:00 ***Session end***

13:30 (for as long as needed) ***Break out rooms for poster viewing and general and informal discussions, including standard mosses and the specimen archive.***

Note: Use the separate meeting joining link for breakout rooms.

Session: **Ozone 1** **Chair:** **Nivedita Chaudhary**

13:30 *Evgenios Agathokleous* - Ozone impacts on plant communities, plant-insect interactions, and plant-soil feedbacks

13:50 *Giacomo Gerosa* – Ozone risk assessment for a deciduous mature forest from seven years of flux measurements

14:10 *Ignacio González-Fernández* – Parametrization of soil moisture index in the DO3SE model for ozone risk assessment

14:20 *Andrea Vannini* – Foliar applications of sweet chestnut (*Castanea sativa* Mill.) wood distillate shields a common horticultural plant (*Lactuca sativa* L.) from ozone induced damage

14:40 ***Posters, updates, annexes etc:***

Yasutomo Hoshika – Forest monitoring for forest protection against ozone on the stomatal flux basis: The mottles approach (*Poster*)

Fanny Boublin – Potential role of proline in plant responses to ozone? (*Poster*)

Zhaozhong Feng – Ozone pollution threatens the production of major staple crops in east Asia

Katrina Sharps – Global modelling of ozone impacts on crops

Lisa Emberson – Latest developments with DO_3SE model and application

Scientific Background Document –B updates

15:20 ***General discussion***

15:30 ***Comfort break***

Session: **Ozone 2** **Chair:** **Katrina Sharps**

15:45 *Clare Brewster* - µCT 3D imaging reveals effects of ozone on wheat grains

15:55 *Melissa Chang Espino* – Nitrogen and carbon isotopic signalling in Mediterranean wheat under ozone fumigation and additional nitrogen

16:15 *Håkan Pleijel* - Effects of ozone, drought and heat stress on wheat yield and grain quality

16:35 *Pritha Pande* - Can ozone-flux response relationships for wheat be derived using photosynthetic based stomatal conductance models?

16:55 *Pierluigi Guaita* – Use of data from local monitoring network to assess the ozone risk for crops at regional level: The Lombardy region case study

17:15 ***General discussion including the Workplan***

17:30 ***Session end***

Wednesday 23rd February, 2022

Session: Moss 3 **Chair:** Mike Perring

09:30 *Inga Zinicovscaia* - Accumulation of potentially toxic elements in mosses collected in the Republic of Moldova

09:40 *Jeroen Geurts* – Moss survey in The Netherlands 2020-2021

09:50 *Jana Borovská* – Biomonitoring of atmospheric deposition of heavy metals in Slovakia in 2020-2021

10:00 *Ágnes Bálint* - Measurement of air deposition of heavy metals in the area of south-west Hungary using moss bioindication

10:10 *Anastasia Zhuravleva* - Moss monitoring in the study of the accumulation of trace elements in the Udmurt Republic, Russia

10:20 *Musaj Paçarizi* – Estimation of elements' concentration in air in Kosovo through mosses as biomonitors

10:30 ***General discussion***

11:00 ***Comfort break***

Session: Moss 4 **Chair:** Camiel Aggenbach

11:15 *Stefan Fränzle* - Moss- and chitin-based monitoring: further pieces of information from adsorption thermodynamics

11:35 *Fabrizio Monaci* – Atmospheric mercury monitoring by moss transplants: Current perspectives and limitations

11:55 *Alexander Uzhinskiy* - Central Russia heavy metal contamination model based on satellite imagery and machine learning./development of Data Management System and Modelling

12:15 *Kayla Wilkins* - Moss biomonitoring in Canada: A community science initiative

12:25 ***General discussion***

13:00 ***Session end***

Session: **Ozone (3) and nitrogen** **Chair:** **Rocío Alonso**

13:30 *Per Erik Karlsson* - Total deposition and canopy exchange of inorganic nitrogen to Norway spruce forests in Sweden

13:50 *Sabine Braun* - Nitrogen effects on the vitality of *Fagus sylvatica* and *Picea abies* forests in Switzerland

14:10 *Raquel Ruíz-Checa* – Use of labelled nitrogen to estimate foliar nitrogen uptake in Mediterranean holm oak forests

14:30 *Valda Araminiene* - Situation with ground-level ozone and nitrogen in Lithuania during 2020-2021

14:50 *Sirkku Manninen* - The relationship between NH_3 in urban air and the diversity of epiphytic macro lichens

15:10 ***General discussion***

15:20 ***Comfort break***

Session: **Ozone 4** **Chair:** **Jürgen Bender**

15:30 *Viki Bermejo* – Pre and post-pollination tropospheric ozone effects in *Silene ciliate* a Mediterranean alpine species

15:50 *Ane Vollsnes* – Ozone-induced early senescence studied in *Trifolium repens* genotypes from subarctic grasslands

16:10 *Susana Elvira* - Risk of ozone injury in leafy crops under Mediterranean conditions

16:30 *Sabine Braun* - Epidemiological estimate of growth reduction by ozone in *Fagus sylvatica* and *Picea abies*: Sensitivity analysis and comparison with experimental results

16:40 *Gudrun Schuetze* – German experience and views on reporting exceedance of flux-based critical levels in the context of EU regulations

17:00 ***General discussion***

17:30 ***Session end***

LIST OF POSTERS

OZONE

Author(s)	Title
Boublin et al.	POTENTIAL ROLE OF PROLINE IN PLANT RESPONSES TO OZONE?
Paoletti et al.	FOREST MONITORING FOR FOREST PROTECTION AGAINST OZONE ON THE STOMATAL FLUX BASIS: THE MOTTLES APPROACH

MOSS SURVEY

Author(s)	Title	Break-out Room
Allajbeu et al.	ATMOSPHERIC DEPSITION STUDY OF ANTHROPOGENIC METALS (Cr, Co, Fe, and Ni) BY MOSS BIOMONITORING	1
Bačeva Andonovska et al.	USING MOSS BIOMONITORS AS AN INDICATOR OF RARE EARTH ELEMENTS DEPOSITS OVER SMALL MINING AREA OF As, Sb and Tl	1
Barandovski et al.	DISTRIBUTION OF THE AMBIENT RADIATION DOSE LEVEL BY USING PASSIVE MOSS BIOMONITORING IN MACEDONIA	1
Cakaj et al.	CENTAUREA CYANUS A NEW POSSIBLE BIOINDICATOR FOR HEAVY METALS POLLUTION	2
Hristozova et al.	PRELIMINARY DATA FROM THE 2020-2022 MOSS SURVEY CONDUCTED IN BULGARIA	2
Kosior et al.	THE MOSS BIOMONITORING METHOD AND NEUTRON ACTIVATION ANALYSIS IN ASSESSING POLLUTION BY TRACE ELEMENTS IN SELECTED POLISH NATIONAL PARKS	2
Nezha et al.	PRELIMINARY STUDY OF MICROPLASTICS ATMOSPHERIC DEPOSITION STUDIED BY MOSS BIOMONITORING	3
Pacín et al.	MONITORING AND MAPPING PAH LEVELS IN PM10 AND BULK DEPOSITION USING MOSSPHERES: A PILOT STUDY IN AN URBAN ENVIRONMENT	3
Sopaj et al.	FIRST STUDY ON NITROGEN PRESENCE IN MOSSES SAMPLES IN KOSOVO BY KJELDAHL METHOD	3
Stihi et al.	REVIEW OF 2010-2020 MOSS SURVEYS FOR HEAVY METAL ATMOSPHERIC DEPOSITION IN ROMANIA	4
Świsłowski et al.	MOSSES AS A BIOMONITOR OF AIR POLLUTION WITH HEAVY METALS FROM POINT SOURCE OF POLLUTION	4
Tepanosyan et al.	FACTORS CONDITIONING THE CONTENT OF CHEMICAL ELEMENTS IN MOSSES AND SOILS OF ARMENIA	4