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**AMMONIA ABATEMENT AND PREPARATION FOR THE
REVIEW OF THE GOTHENBURG PROTOCOL**

Report by the Chairmen of the Expert Group on Ammonia Abatement and an expert panel of the
Task Force on Emission Inventories and Projections on agriculture and nature,
in collaboration with the secretariat

Introduction

1. In accordance with the work-plan for the implementation of the Convention (ECE/EB.AIR/83/Add.2, annex XIII, item 1.9), and at the invitation of the Government of Spain, the Expert Group on Ammonia Abatement held its sixth meeting from 13 to 15 April 2005 in Segovia (Spain). This was the third meeting held jointly with a panel on agriculture and nature of the Task Force on Emission Inventories and Projections. Experts from the following Parties attended: Austria, Canada, Czech Republic, Denmark, Finland, Germany, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Russian Federation, Slovenia, Spain, Switzerland and United Kingdom. A representative of the European Fertilizer Manufacturers Association (EFMA) was present. A member of the Centre for Integrated Assessment Modelling (CIAM) was also present. A member of the secretariat attended. Minutes of the meeting and presentations are available on the website of the Expert Group:
<http://www.unece.org/env/aa/welcome.htm>.

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2. In the absence of the Chairman of the Expert Group, Jim Webb (United Kingdom), Ulrich Dämmgen (Germany) and Nick Hutchings (Denmark) chaired the meeting.
3. Mr. Manuel Bigeriego, Ministry of Agriculture, Fisheries and Food (Spain) opened the meeting.
4. Mr. Dämmgen noted the importance of updating the EMEP CORINAIR Emission Inventory Guidebook (the Guidebook), revising the Guidance Document on Control Techniques for Preventing and Abating Emissions of Ammonia (EB.AIR /1999/2, chap. V; hereafter the guidance document) and supporting Parties in developing and disseminating, at national level, codes of good agricultural practice for reducing ammonia emissions, based on the Framework Advisory Code of Good Agricultural Practice for Reducing Ammonia Emissions (the framework advisory code)(EB.AIR/WG.5/2002/3).
5. Mr. Hutchings noted that the revision of the guidance document should take into account best available technologies (BAT) reference documents (BREFs) and the integrated pollution prevention and control (IPPC) process. He invited CIAM to report on the results of its questionnaire on farm practices and agricultural ammonia abatement techniques and underlined the importance of improving agricultural and non-agricultural ammonia emission inventories. He noted the importance of capacity-building in Eastern Europe, Caucasus and Central Asia (EECCA) countries. He also recommended that the Expert Group seek, for its next meeting, a suitable venue to attract EECCA experts and that it explore possibilities for a seminar in English and Russian possibly in 2006-7, on ammonia abatement techniques and ammonia emission inventories in the region.

I. PREPARATION FOR THE REVIEW OF THE GOTHENBURG PROTOCOL

6. Ms. B. Wachs (secretariat) explained the mandate of the Expert Group, adopted by the Executive Body at its twenty-second session, and noted that the 1999 Gothenburg Protocol would enter into force on 17 May 2005 and the first review would commence within one year of that date.
7. The first meeting of Parties to the Protocol would take place at the twenty-third session of the Executive Body (12-16 December 2005) where Parties may consider the timing, methods and procedures for the review. Reviews should take into account emission ceilings for ammonia (annex II, table III), as well as measures for the control of emissions of ammonia from agricultural sources (annex IX).

II. AMMONIA EMISSION INVENTORIES AND UPDATING OF THE EMEP CORINAIR GUIDEBOOK

8. Mr. Dämmgen informed the Expert Group on improvements to chapters 10 (nature) and 11 (agriculture) of the Guidebook. He described the structure and aims of the Guidebook and the contents of each chapter. Ms. M. J. Sanz (Spain) illustrated difficulties in determining emissions from fertilizer application by experiment; little information was available throughout Europe on ammonia concentrations.

9. The Expert Group took note of two draft chapters for the Guidebook - on emissions of particulate matter (PM) from arable agriculture and on emissions from animal husbandry. Mr. G. Jan Monteny, Mr. Z. Klimont and Mr. J. Mikkola offered to review the chapters. The importance of quality assurance and quality control in developing emission factors was underlined.

10. Experts had explored discrepancies between emissions reported in ammonia inventories and depositions of ammonia, and the Expert Group proposed a joint workshop with the Task Force on Measurements and Modelling. The aim of the workshop would be to explore ways to improve the use of ammonia emission models in the modelling of deposition. The Expert Group recommended that countries adopt the total ammoniacal nitrogen (TAN)-flow approach for estimating ammonia emissions and that modelling of mass flows should be extended to all nitrogen and carbon species.

III. REVISION OF THE GUIDANCE DOCUMENT ON CONTROL TECHNIQUES FOR PREVENTING AND ABATING EMISSIONS OF AMMONIA

11. The Expert Group discussed progress made on updating the guidance document in preparation for the review of the Gothenburg Protocol, recognizing the importance of harmonizing the guidance document with the relevant IPPC BREFs, in particular with respect to intensive livestock farming.

12. Additional updates should be submitted to the Chair by the end of May 2005. The Expert Group would aim to finalize the revision of the guidance document at its next meeting in 2006.

13. Mr. Z. Klimont (CIAM) presented the results of a survey carried out in 2004-5 on farm practices. A questionnaire was developed by CIAM, at the invitation of the Expert Group in 2003, with regard to a verified set of data characterizing agriculture, for the purposes of modelling air emissions and for integrated assessment modelling. The questionnaire, distributed to national experts, asked questions on farm characteristics, storage/waste management and application of

manure. Eighteen countries replied, mostly from north-west Europe, as well as Hungary, Poland and Slovenia. Results provided information on costs and abatement efficiencies used in integrated assessment modelling and information on farm size, milk and meat yields, nitrogen excretion, manure storage and grazing practices of dairy cows. Data proved useful in bilateral consultations on emissions and as input for revision of the guidance document. The Expert Group requested results to be made available on its website.

IV. COST CALCULATION PRINCIPLES IN AMMONIA ABATEMENT

14. The Expert Group considered approaches to calculating costs for ammonia abatement measures and development of cost curves. Cost curves were used to inform policy makers on cost-effective measures to be adopted by industry, combining costs and efficiency of measures with emissions, applicability and abatement potential. The Expert Group noted the need for a common costing technique on ammonia abatement.

15. Mr. Klimont while explaining cost calculation principles in integrated assessment modelling, noted that emission control options in RAINS included low nitrogen feed, low emission housing, biofiltration (air purification), covered storage (low and high efficiency), low ammonia application (low and high efficiency), urea substitution and combinations of these.

16. The Expert Group supported the adoption of common methods or templates for the calculation of costs of ammonia abatement and the use of the IPPC BREF approach, while recognizing the importance of local cost information. Understanding differences in costs between countries would lead to the development of more cost-effective techniques for ammonia abatement. A common approach to cost calculations would allow objective affordability assessments. The merits of considering cost issues in a sub-group (panel) of the Expert Group were considered.

V. CONCLUSIONS AND RECOMMENDATIONS

17. The Expert Group agreed that:

(a) With the entry into force of the Protocol to Abate Acidification, Eutrophication and Ground-level Ozone, it would continue to update the guidance document on control techniques for preventing and abating emissions of ammonia (EB.AIR/WG.5/1999/8/Rev.3), in particular, the introduction and sections I, II, III (slurry storage), IVA (housing systems for dairy and beef cattle), IVB (housing systems for pigs) and IVC (housing systems for poultry), V and VI;

(b) Updated sections III, IVA and IVC of the guidance document represented the state of the art of current research; further work was needed on sections IVB and others, in particular to

incorporate updates to IPPC BREFs. The updated guidance document was expected to be submitted to the Working Group on Strategies and Review at its thirty-eighth session in September 2006 for approval and publication. References to data in the current draft of the guidance document should be specified. Updated information in the guidance document would be reflected in the updates of the EMEP CORINAIR Atmospheric Emission Inventory Guidebook;

(c) Chapter 10 (agriculture) of the Guidebook would be revised by experts from both the Expert Group and an agriculture and nature panel of the Task Force on Emission Inventories and Projections, to ensure that information in these chapters was appropriate and user-friendly;

(d) Further work was needed on the Guidebook for ammonia emissions from non-agricultural sources such as pets. It was important to clarify what was included in non-agricultural emissions, particularly in light of possible revision of the emission ceilings for ammonia under the Protocol;

(e) Updated Guidebook chapters should separate instructions on inventory construction from background information. Updating should include greater integration with the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines. The Expert Group would explore possibilities for developing Internet links between the Guidebook and IPPC BREFs;

(f) In order to attain improved emission inventories, greater participation in Expert Group meetings of those responsible for construction and submission of agriculture emissions was needed;

(g) It would seek relevant topics and a suitable location to organize a joint workshop between the Expert Group and the EMEP Task Force on Measurements and Modelling, depending on a request from the modelling community;

(h) It would explore avenues for capacity building on ammonia abatement and ammonia inventories in the EECCA region. The Expert Group invited the secretariat to report on the results of the CAPACT workshop (2005, Almaty), particularly with regard to needs in developing emission inventories, to its next meeting;

(i) The book entitled "Emissions from European Agriculture", produced by Poland and based on material from its fifth meeting (Poznan, 2004) and other research was a valuable tool. The book covered measurements and modelling, emissions and projections, and techniques and costs for abatement of ammonia and other nitrogen compounds and was considered useful for countries with economies in transition;

(j) It would consider setting up an informal group (panel) to provide the Expert Group with input on costs;

(k) The next meeting would be held from 26 to 28 April 2006 (location to be confirmed). A meeting in a country with economy in transition was preferred. Depending on resources, the next meeting could possibly be preceded by a joint training session (Convention and IPPC) for inventory makers.