

CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

International Co-operative Programme on Effects on Materials, including Historic and Cultural Monuments

Minutes of the 25th Meeting of the Programme Task Force

1-3 April 2009, National Centre for Metallurgical Research, Madrid

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The twenty-fifth meeting of the Programme Task Force of the International Co-operative Programme on the Effects on Materials including Historic and Cultural Monuments was held in Madrid, Spain on April 1-3, 2009. The meeting was hosted by the by the National Centre for Metallurgical Research (CENIM), Madrid, Spain and the meeting was held at CENIM.

The meeting was attended by representatives from the following Parties to the Convention on Long-Range Transboundary Air Pollution: Austria, Czech Republic, France, Germany, Greece, Italy, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and a member of the UNECE Secretariat.

1. Opening of the meeting

As co-chairmen of ICP Materials, *Johan Tidblad* and *Stephan Doytchinov* welcomed all participants and thanked CENIM for organizing the meeting and declared the meeting opened.

2. Approval of the Draft Agenda

The draft agenda was approved.

3. Introduction

The meeting participants introduced themselves, primarily to Chris Tzanis, new member of the group, and Francisco Ferreira, possible new member.

Johan Tidblad introduced the meeting, pointing out the on-going trend exposure and the work plans for 2009 and 2010 as the most important topics for the meeting.

4. Information from the local organisers

The meeting host, *Daniel de la Fuente*, welcomed everybody to CENIM and informed about the excursion planned for Friday.

5. Information from WGE

Matti Johansson from the UNECE Secretariat gave a presentation on the Convention on Long-range Trans-Boundary Air Pollution, celebrating its 30 year anniversary this year, and of the Gothenburg Protocol celebrating its 10 years anniversary. The 1999 Gothenburg Protocol covers the multi-pollutant and multi-effect situation. All Convention bodies are encouraged to contribute to the on-going revision of the Gothenburg Protocol.

Further information from WGE are included under point 8e) common work plan items for all ICPs

6. Discussion of on-going trend exposure 2008-2009

a) Starting/stop dates

Johan Tidblad presented a list of start dates for trend exposures and passive sampling. All have started between October and November 2008, within a time span of only 1,4 months, which is good for the quality of the data.

b) Passive sampling of pollution data

First results from most sites are available or will be available soon. According to *Stephan Doytchinov*, not all measurements can be performed at the Sofia test site, hydro-meteorological and particulate data will be supplied but it is not known if nitric acid is measured.

With particle sampling, a possible problem when exchanging filters under rainy conditions has been identified, the instructions from the Swedish Environmental Institute (IVL) will be updated to describe how these samples should be handled in order to avoid moist trapped during transportation.

Johan Tidblad showed preliminary results from sampling performed so far. Based on this limited information, nitric acid results show slightly higher levels 2005/6 and lower levels 2008/9 as compared to the first year 2002/3.

c) Collection of environmental data

Terje Grøntoft discussed collection of environmental data. To avoid unnecessary work everybody is requested to use the new form for reporting environmental data. Mandatory data include temperature, humidity, SO₂, NO₂, O₃, HNO₃, amount, pH, SO₄²⁻, NO₃⁻ and Cl⁻ of precipitation and passive sampling of PM using the IVL sampler. *Francisco Ferreira* pointed out that information at the project web site concerning this matter is incorrect, to be updated by *Johan Tidblad*.

During the 2005/6 trend exposure, data from several stations were delayed and some data are still missing. The most frequent problem was reporting of precipitation data, especially pH and total amount is important. If it is still possible to obtain lacking data for 2005/6, please report these to *Terje Grøntoft*, as this will be valuable in future evaluations and reports.

For the present trend exposure, a better strategy for obtaining data is required. It was decided to produce a short mid-term report including information on data sources and methodologies. The short report will be part of this year's technical manual for the trend exposure, see paragraph 8c).

Sampling for the present trend exposure shall be one year, covering the exposures of the specimens. The reporting period will thus be October 2008 to October or November 2009 depending on start of exposure.

The reporting of environmental data report must be finished in the spring / early summer 2010. The last data from the sites is expected during February or March 2010 and all data is needed latest at the end of April. *Terje Grøntoft* will send out a reminder in January 2010. However, it is highly recommended to supply data as soon as they are obtained, to track possible problems, one example lack of data for pH of precipitation.

7. Discussion of 2008 work plan: Progress report on corrosion and air pollutant trends in the period 1987-2006

Johan Tidblad made a short presentation of Report 56 presenting trends in pollution and corrosion 1987-2006. The report has been distributed to all partners; it is a final report from last years work plan for the UNECE Working Group on Effects.

There are still some questions concerning zinc showing an increasing trend from 1996 for three sites, all cold climate sites. What is worth noting is not only the increase but the high level of corrosion at these clean sites. Increasing humidity could be one explanation. Other factors that may influence corrosion rate may be temperature, effects from snow, acids from biofuels (Oslo) or from surrounding forest (Aspvreten) and high ozone levels (Chaumont).

Katerina Kreislová suggested analysing corrosion products, checking possible changes in solubility or organic contents. *Markus Faller* suggested capillary electrophoresis for finding substances included in the corrosion products.

8. Discussion of 2009 work plan

a) Report on assessment of stock of materials at risk including cultural heritage

This work plan item will be reported both in ICP Materials technical document ECE/EB.AIR/WG.1/2009/8 (max 3300 words / 10 pages), deadline April 30, 2009 and in more detail in Report No 61: Stock at risk assessments of materials including cultural heritage. The contents of report 61 were discussed.

Tim Yates presented an overview of studies performed so far. Possible sources include data from the CULT-STRAT project and the 1996 UNECE workshop on economic evaluation. *Johan Tidblad* asked for information regarding possible publication plans for CULT-STRAT results on stock at risk besides the Springer book. Everyone is asked to check for national studies and other information and report to *Tim Yates* by end of May.

b) Report on combined stock at risk and mapping for selected urban areas of Italy

Report 60 is a specific stock at risk study that will be produced by *Stephan Doytchinov*, who presented an overview of the results. It was demonstrated that calculated corrosion rates based on EMEP data underestimates corrosion rates in the city centers. A draft of the report will be circulated by the end of April, deadline for the final version is September.

When comparing Milan and Rome data, effects both from changed pollutant levels and from differences in climatic conditions had an influence. It was suggested to use long term average climatic data to avoid “special years” for risk maps. *Tim Yates* suggested using sensitivity analysis for climatic factors.

Interest from policy makers in effects of pollutants was discussed. *Stefan Brueggerhoff* claimed that, although pollutant levels are generally low, there is still interest in risks for specific monuments when planning industries, roads etc. Since the primary goal for policy makers is health, linking to material issues would be valuable and costs for cleaning could be another area of presumed interest.

c) Technical manual for the 2008-2009 trend exposure

The technical manual, Report 58, will include

- National contact persons (*all*)
- Description of test sites including start of exposure (*all*)
- Labels and marking (*Johan Tidblad*)
- Handling (*Johan Tidblad*)
- Specific instructions (Sub-centres)
- Passive samplers (*Terje Grøntoft*)
- Collection of environmental data (*Terje Grøntoft*)

The site descriptions shall include

- Short verbal description including lon-lat information
- Description of measured data (methods, on-site/nearby site (distance) for mandatory parameters
- If applicable: description of instances when the rack has been moved and why
- Photograph of the rack, including sheltering box in connection with the exchange of passive samplers June 2009
- Map or photograph of surroundings, from Google or other sources

Descriptions from most sites are available; however, some data are missing, including the additional information mentioned above. All are encouraged to take photographs in connection with the next visit to the rack. Special factors to take into account, for example heavy winds, should be included in the specific site information. It was decided to produce a specific example that will be distributed to all. All data should be sent to both *Johan Tidblad* and *Terje Grøntoft*.

In addition, special presentations were made of site 10 and site 53:

Site 10, Bottrop: The site is about 20 years old, located in an urban area with industrial plants nearby. There is a coking plant 700m to the south-west, which is the dominating wind direction. There is a harbor area and other industrial plants in the vicinity. There is no major traffic influence, thus low concentrations of NOx. All data but precipitation data, will be measured at the site. Since the area is heavily polluted, measurements are likely to continue. The site is located close to a school, and this has caused no problems so far.

Site 53, Vienna: The site is in an urban residential area, not very close to traffic or industry. It belongs to the Central Institute for Meteorology and Geodynamics. PM₁₀ will not be measured directly at the site. The rack is on a flat roof together with instruments for sun radiation etc. Photos from the site and of the rack were shown.

d) Report on soiling of exposed materials

Tiziana Lombardo presented recent results for soiling of modern glass and dose-response functions based on the haze parameter, Report 59. The new functions include besides PM also the effect of SO₂ and NO₂ but surprisingly not the effect of temperature and relative humidity. These new results triggered a long discussion about possible causes.

Gases and particles would have, at least partly, a common source – industry for SO₂ and traffic for NO₂. It is not necessarily SO₂ and NO₂ that form particles, but SO₂ and NO₂ may say something about the environment. Salt crystals, including NO₂ and SO₄, have been identified on the glass surfaces. Similar products may indicate glass corrosion but this was not the case here, composition of the particles on the surface is the same as in the air.

Possible correlations between environmental parameters were discussed and how this could influence the results.

An important aspect is how these results should be translated to policy.

A draft of the report has been circulated by mail. Everyone is encouraged to make comments to the report, before the end of May. The comments should be sent directly to *Tiziana Lombardo*.

e) Common items for all ICPs

i) Status report on nitrogen

A draft of the report exists which includes some text from each of the ICPs. The only corrosion related issue so far is nitric acid, NO₂ as oxidant is not since NO₂ may have importance to e.g. organic materials. It should be made sure that nitric acid is included in the final version but not given too much attention, it is not important for all materials. Effects of NO₂ as oxidant should be added. A new version of the text is

“High levels of atmospheric reactive N in the form of nitric acid (HNO₃) is harmful to some materials, especially in urban, high traffic areas, contributing to economic loss and the degradation of cultural heritage. HNO₃ is highly acidic, and causes increased metal dissolution on the adsorbed water layer on materials. In particular, HNO₃ is included in dose-response functions for the indicator materials zinc and limestone, but not for carbon steel. It is one of the contributors to corrosion in the multi-pollutant situation together with other acidifying pollutants. Reactive nitrogen in the form of NO₂ can act as an oxidant and laboratory experiments have shown a synergistic effect of SO₂ and NO₂ on several materials. NO₂ can also be important for the degradation of certain polymer materials but these materials have not yet been exposed in the ICP Materials test site network.”

Comments or suggestions for improvements to the text should be sent to *Johan Tidblad*.

ii) Compilation report on selected parameters

“Draft guidelines for reporting on the monitoring and modelling of air pollution effects”, Document ece.eb.air.wg.1.2008.16.e. The document summarises the most important methodologies and parameters that are measured by the ICPs. The guidelines could i.a. be used when applying for grants in individual countries since they are formally adopted.

A few errors were noted in the document. *Matti Johansson* informed that changes and additions can be made to future updates (dates unknown) and the importance is what we can show, whether or not is based on measuring or modelling.

iii) Report on the update of the strategy of effects-oriented activities

Document EB.AIR.WG.1.2005.15.Rev.1.e is a draft long-term strategy for the effect-oriented activities. *Matti Johansson* presented the most recent version. The draft will be distributed by the Bureau giving the opportunity to suggest changes.

In the present version, cultural heritage is not mentioned, nor is soiling. Stock at risk is another important key activity worth mentioning that needs to be strengthened if materials are to be included in IAM.

iv) Target settings for 2020 and 2050, in collaboration with TFIAM (task force for integrated assessment modelling) and CIAM (centre for integrated assessment modelling)

The WGE Extended Bureau is preparing documentation intended for policy makers. It includes aspirational targets for 2050, targets for 2020 and indicators.

Stephan Doytchinov reported from the Utrecht joint TFIAM/ACCENT workshop “Policy-relevant indicators for Materials”. The workshop concerned setting non-binding targets for air pollution for the year 2050. Tolerable levels 2010 and proposals for 2020/2050 were discussed claiming that there are no thresholds or critical loads/levels, every reduction for materials corrosion are important. Current tolerable levels for corrosion are 2,5 times the background and for soiling 35% loss in reflectance. It was concluded that protection of materials and cultural heritage may in some areas require stricter air pollution targets than the protection of health and ecosystems. Tolerable SO₂ levels can be very low in areas with high humidity / precipitation but higher in dryer areas. For cultural heritage it is possible that effects of climate change will result in stricter air pollution targets for multi-pollutants (SO₂, HNO₃, PM). For visual appearance (soiling) tolerable levels are in the range 10–20 µg/m³ depending on assumed cleaning intervals (10-20 years).

Johan Tidblad claims there is now more pressure for us to be more involved in policy work, for this we need to simplify our results. We should open your minds for long-term goals, 50 years from now, and try to fix dates for how long materials should be protected, 30, 50, 100 years from now (*Matti Johansson*). Corrosion targets must be translated to emissions. It is important to include Eastern Europe in our work, and to include targets for corrosion in different parts of the world. Attempts to include Russia in our work have failed, but according to *Matti Johansson* Russia is starting to show some interest, wishing to co-ordinate work in the Russian speaking countries.

Matti Johansson informs that the Task Force on Integrated Assessment Modelling recommends all WGE bodies to inform their national contacts at the new network of NIAM (National Integrated Assessment Modelling). The national contacts can be found via the NIAM website, www.niam.scarp.se.

- v) Further quantification of policy-relevant effects indicators (such as biodiversity change)

Our future work must be more “commercial” (*Matti Johansson*). What is the most exciting indicator, what is best in showing success? How can we simplify even more? The selling parameter should be something different from the scientific parameters. We have to leave our scientific world and present one very important thing. These matters will be discussed during the next meeting - what is important from a material point of view, what is the situation in each country, i.e. we should try to identify the “Taj Mahal” in each country. Perhaps the UNESCO world heritage list could be a starting point?

9. Discussion of 2010 work plan

- a) Report on recent results of corrosion from the 2008-2009 trend exposure

The report will be a collection of data without statistical analysis. In 2011, an updated trend report will be elaborated, including all environmental data from the full exposure and a statistical analysis.

Results from the present trend exposure will be compiled as follows:

- Carbon steel (SVUOM)
- Zinc (SVUOM & EMPA)
- Limestone (BRE)
- Modern glass (LISA)
- Teflon (KIMAB)
- Environmental data (NILU)

The sub-centers should start analysis immediately after obtaining samples. A first draft of the report should be available at the next meeting; the final report shall be presented in Geneva in September 2010. The work suggested was approved by the meeting.

- b) Report on validity of dose-response functions for different climatic conditions

Dose-response functions from ICP Materials are valid for present Europe. Due to climate change conditions will be different in the future and the dose-response functions may not necessarily be applicable in all areas of Europe, especially in places with extreme temperature or humidity conditions. This is important when elaborating future scenarios and combined effects of pollution and climate. Therefore it is worthwhile to test and validate the functions for other climatic conditions based on data in regions outside Europe that are available today.

The work suggested was approved by the meeting.

- c) Report on economic evaluation of corrosion of materials including cultural heritage

The suggested report would be a natural continuation of the report this year on stock-at-risk. The same methodology will be used, soiling will be included and the data used will be data collected within ICP Materials, CULT-STRAT and other projects. The aim will be to synthesize the results and propose methods for including results from ICP Materials in the work in integrated assessment modeling in the future.

The work suggested was approved by the meeting.

- d) Report on combined stock at risk and mapping for Italy at the national level (using EMEP and Italian GAINS model data)

This work, suggested by *Stephan Doytchinov* involves mapping stock-at-risk using risk maps from Italy. An inventory of cultural heritage across parts of Italy will be performed, evaluating possibilities to manage data from different provinces. Dose-response functions for limestone and copper will be used for corrosion mapping, identifying risk areas. Pollution data will be taken from the Gains (previously RAINS) Italian national model and from the last available EMEP data (2005 presently available).

The work suggested was approved by the meeting.

- e) 26th meeting of the Programme Task Force

Tim Yates has volunteered to have the next meeting in London, possibly jointly with the RAPIDC project (Regional air pollution indeveloping countries).

Preliminary dates are 14-16/4-2010 (two or three day meeting). The date should be fixed before the extended Bureau meeting in November 2009.

- f) Other work not formally included in the workplan

The soiling activities at LISA will continue; samples will be removed in October 2009 after 1 year exposure. Since useful results are not expected until after the full 4 year exposure period, there will be no additional report next year.

Johan Tidblad pointed out that racks etc. at the exposure sites should be kept intact for future trend exposures, the next to start in 2011.

10. Financing of the Programme

Sweden: A new contract has been given every year by the Swedish Environmental Protection Agency. There is no information on planned cut-backs.

Spain: There is a four year contract with the ministry until 2010. Since the ministry has expressed interest in continuing the work, it should be possible to continue at least 2 or 3 years.

United Kingdom: The budget expected (not confirmed) is limited but considered sufficient to finish the evaluation of stone samples. The UK representative cannot commit to any additional work.

France: A contract for four years is expected, although at a lower level than presently. Work planned for the next two years can be performed.

Greece: Some funding is available, possibilities for additional funding for starting a second station are examined.

Germany: Funding for this year, covering travel to meetings and exposure sites only, is expected. Umweltbundesamt may provide a very limited budget.

Austria: The situation is similar to that of Germany, with no official budget, other funds can be used temporarily for covering costs for passive samplers and environmental data. The next two years should be o.k, after that the situation is unknown.

Switzerland: The future for the EMPA corrosion group is unknown, thus possibilities for funding are unknown. Information may be available in about three months. The evaluation of zinc samples will still be finished.

Czech Republic: There is a budget from the ministry of the environment, but no contract has been signed for this year. There will likely be no problems.

Norway: Even if the contract for this year has not yet been signed, no problems are foreseen.

Italy: No specific problems are foreseen. So far, data and room for racks etc. have been obtained free of charge.

11. Any other business

Answering a question on distribution of our reports, *Johan Tidblad* informed that all reports are exposed at the Working Group of Effects meeting and that anyone in that group can obtain a copy. The reports are public and can be obtained from the sub-center. The reports are distributed to all ICP Material partners.

Possible limitations in distribution of reports and results were discussed. Prime concern is spreading of environmental data. The opinion expressed by the meeting is that old reports, with old data, can be spread more widely. Report no 30, with the eight year trend data, is sometimes requested. It was suggested to post it on the web site since data is old and the whole database is not included. Since we are not allowed to divide the website, all is open, we have to think about what we publish. Guidelines concerning dissemination exist, there are no restrictions from UNECE.

The meeting decided that a soiling paper, including parts of the report planned, can be published provided conclusions etc. are the same as in the report presented for the Working Group on Effects, and that an acknowledgement on the different test sites is included. It is recommended to send a draft of the manuscript to the ICP Materials Task Force before publishing.

12. Closure of the meeting

Johan Tidblad and *Stephan Doytchinov* thanked CENIM for their hospitality and a well organized meeting and the participants for a very interesting meeting. With this the meeting was closed.

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