**Korrosionsinstitutet**
Swedish Corrosion Institute

Stockholm
Monday 29 May 2000

**CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION**
**International Co-operative Programme**
**on**
**Effects on Materials, including Historic and Cultural Monuments**

MINUTES OF THE SIXTEENTH MEETING OF THE PROGRAMME TASK FORCE
May 11-12, 2000, Paris, France

Prepared by the Main Research Centre,
Swedish Corrosion Institute, Sweden

1 The sixteenth 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 Paris, France from May 11 to 12, 2000. The French Environment and Energy Agency (ADEME) and University Paris XII hosted the meeting, which was held in the premises of Laboratoire de Recherche des Musées de France (LRMF), Palais de Louvre, Paris, France.

2 The meeting was attended by representatives from the following Parties to the Convention on Long-Range Transboundary Air Pollution: Belgium, Canada, Czech Republic, Finland, France, Germany, Israel, Italy, Norway, Portugal, Russian Federation, Sweden, Switzerland and the United Kingdom.

3 The meeting was introduced by Mr Roger-Alexandre Lefèvre on behalf of University Paris XII and Mr Jean-Pierre Mohen, Director of the LRMF. Mr V. Kucera chaired the meeting.

4 The main items discussed at the meeting were:

a) Results from the multipollutant exposure programme
b) Possibilities of extending the multipollutant exposure programme to include new materials and environmental parameters, including financing
c) Use of results for mapping and calculation of costs
d) Reporting from ICP Materials to the Working Group on Effects

5 Discussion on results from the multipollutant exposure programme

*a) Measurements and reporting of environmental data*

The environmental data corresponding to the first year of exposure in the multipollutant programme have been published in the report series; Report No 34: Environmental data report September 1995 to October 1998. Members of the Task Force may request additional copies from the environmental sub-centre. The procedure of generating missing values in order to compensate for seasonal variations has been postponed due to the anticipation of further reporting of values from individual countries and also due to the limited data available at the new test sites. Compared to the original exposure programme the reporting period has been shifted from September - August to November - October since the

multipollutant exposure started approximately two months later in the year. From now on the environmental data reports will be presented annually, November 1998 to October 1999 for the second year of the multipollutant programme, etc. September 1997 and October 1997 is not included in report 34 for practical reasons but members may request the additional data from the environmental sub-centre.

The reporting of environmental data is improving compared to the first year but is still not of the same quality as in the original programme. The final date for reporting the environmental data corresponding to the second year of exposure (November 1998 to October 1999) to the environmental sub-centre is June 30, 2000. The third year environmental data should be reported by February 28, 2001. Rather than postponing the delivery due to the anticipation of a complete data set it is better that each national contact person sends the available data at the given dates to the environmental sub-centre and the remaining data when available. A new form for reporting data, 'ece-form.xls', was distributed. From now on this updated form should be used when sending data to the environmental sub-centre. It was stressed, as in the last meeting, that only monthly data should be reported and that it is the responsibility of the respective national contact persons to calculate monthly values based on the available data. Also, it was stressed that a month without precipitation should be reported with a '0' and not a missing value.

From the reporting so far it is clear that the new test sites constitute a valuable contribution. $SO_2$ concentrations have decreased substantially and the highest value is reported from one of the new test sites but the distribution is fairly good. $NO_2$ has also decreased but not so drastically and the distribution is much better than in the original programme thanks to the inclusion of new test sites. Some problems exist, however, in the reporting of sun and precipitation data.

Discrepancies exist in the data set for sun radiation. At present stage it is not possible for the environmental sub-centre alone to find out the possible sources of error. Therefore it was decided to distribute a form to all national contact persons requesting information on the type of sun measurements performed including used wavelength interval, calibration and calculation procedures. The form (encl.) should be returned to the environmental sub-centre by July 31, 2000 at the latest. By August 31, 2000 the environmental sub-centre will compile the results of the questionnaire in a report.

Italy, Germany and the United Kingdom reported problems in obtaining precipitation data. Without precipitation data, especially pH and total amount, the other data obtained at a site will not be useful for all statistical analyses. It is therefore essential that precipitation data is reported and that all possibilities are explored. It was decided that it is absolutely mandatory to have precipitation data for at least one complete year from all test sites. By June 30, 2000 the national contact persons of Italy, Germany and the United Kingdom should present a report of their strategy to obtain the data to the Main Research Centre.

b) *Presentation and discussion of results for steel, zinc, copper, bronze, limestone, painted steel panels after 1 and 2 years of exposure including trend exposures.*

Each sub-centre gave during the meeting a short oral presentation of results obtained. The exception is the Austrian sub-centre since the first withdrawal of glass samples will be after three years of exposure. After a general discussion it was concluded that it is not necessary to publish separate reports after 1 year of exposure. Due to i.a. the incomplete environmental database it is not possible to perform a reliable statistical evaluation using only data after 1 year of exposure. Draft reports had been distributed prior to the meeting and it was decided, for the individual materials, to publish result after 1 and 2 years of exposure together in the official report series as follows:

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

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

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

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

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

Report No 40. Trends of corrosivity based on corrosion rates of carbon steel and zinc and pollution data (1987-1997).

Report No 41: Environmental data report November 1998 to October 1999.

The final drafts (35-41) on evaluation of corrosion attack should be distributed to all members by March 31, 2001. E-mail distribution is possible. The final data sets on corrosion attack after 1 and 2 years of exposure should be distributed by August 31, 2000. The data set for copper and bronze could be distributed already by May 31, 2000.

Trends based on comparison with results after one year of exposure from the original exposure programme was presented (see p 8).

A new trend exposure will start in the fall of year 2000 and will involve carbon steel, zinc and limestone. For zinc a duplicate trend exposure will be performed, one by the Czech sub-centre and one by the Swiss sub-centre in order to make it possible to estimate possible influences of material composition, sample thickness and surface preparation to facilitate comparison between the data obtained on zinc by these two sub-centres. It was noted that, for some sites, the limestone trend exposure had started earlier than planned. Therefore it was decided that national contact persons not requiring extra limestone samples for the coming trend exposure should inform the UK sub-centre by June 30, 2000.

6 Discussion on the possibilities of extending the multipollutant exposure programme to include new materials and environmental parameters, including financing

The main research centre informed about an application within the 5$^{th}$ EU framework programme to the key action “City of tomorrow and cultural heritage”, which was submitted by February 15, 2000. The proposal involved the development of $HNO_3$ and particulate passive samplers and their testing in the ICP Materials network. Unfortunately the proposal did not pass. A general discussion on the possible reasons followed and it was decided to resubmit the proposal at the next call, anticipated at the end of 2000 / beginning of 2001, taking into account the results from the proposal evaluation and points discussed at the meeting.

7 Discussion on the use of results for i.a. mapping and calculation of costs

In addition to the multipollutant exposure programme the use and dissemination of results is the main task of ICP Materials in the future.

*a) Mapping activities in participating countries and Workshop on mapping*

A "UN ECE Workshop on Mapping air pollution effect on materials including stock at risk" will take place in June 14-16, 2000, Stockholm, Sweden. The workshop is organised by ICP Materials in co-operation with ICP Mapping. The workshop will be attended i.a. by members of the ICP Materials Task Force and members of the Task Force on Mapping. Discussion on mapping activities was postponed to the workshop.

*b) Internet site and brochure for ICP Materials*

A draft web page had been made available prior to the meeting (http://www.corr-institute.se/english/ICP_Materials/ICP-Materials.htm). It was decided that the draft could be used as a starting point but that it should be completed with additional information from all participants. This includes illustrations (photos of test sites, corrosion attack and/or maps), a list of publications of each member presenting and using the ICP Materials data and/or dose-response functions and, if possible, a link to the contact persons institute/organisation. All this information should be sent to the main research centre by June 15, 2000.

The official report series was discussed. It was decided that the complete list of reports should be given at the web site. However, the availability of reports may vary from report to report as follows:

- Not available;
- Executive summary available;
- Entire report available as a pdf file for download;

In the first version of the web page all reports will be unavailable but executive summaries and pdf files will be added continuously as the work on the page proceeds and the decision on the total number of available reports will finally depend on i.a. system requirements.

It was decided that the web site together with a brochure could fill an important gap in the dissemination of results from the programme. The contents of a brochure were discussed and it was decided that the main research centre should prepare a first draft.

## 8 Reporting from ICP Materials to the Working Group on Effects

Several reports have or will be completed for the WGE. This includes an official technical report "Results after 1 year of exposure in the multipollutant programme: Characteristics of new sites and corrosion trends for new materials" from the chairman of ICP Materials (encl.). A draft of the official technical report was distributed and the Task Force approved it with minor changes. In the report it was i.a. concluded that the data on climate, pollution and corrosion from the new sites show clearly that they constitute a significant contribution to the programme by incorporating new pollutant situations and new combinations of climate and pollution.

A substantive report on the "occurrence, movement, and effects of selected heavy metals" is planned. The initiative originates from the Working Group on Effects (WGE) and the report will be prepared jointly by all ICP's of the WGE in the same manner as for the final substantive report on trends (encl.). It was concluded after a discussion that the main part of the contribution from ICP Materials should be a compilation of results for the purpose of assessing run-off of copper and zinc ions from material surfaces.

Preliminary run-off assessments from the sub-centres for copper/bronze (Germany) and zinc (Switzerland), and the main centre (Sweden) were presented and discussed. All calculations presented used a combination of mass loss and weight increase measurements together with assumptions of possible corrosion products in order to estimate the run-off. An alternative to analysing/assuming corrosion products could be to analyse the metal content of the pickling

solution. This was suggested by the zinc sub-centre and will be part of the analytical assessment within ICP Materials. It was concluded that with the procedure of calculating run-off from measurements of mass loss and weight increase it is not possible to separate the run-off from metal ions lost by other means than dissolution by precipitation, i.a. 'blow-off'. Other sources of error were also discussed, including deposited matter and the difference between the upper and lower side of the exposed panel, and it was concluded that the calculated results needs to be verified by comparison with real run-off measurements at a selection of test sites. Anyhow, the results will be useful for presenting order-of-magnitude results and for estimating possible contributions of acidifying pollutants to the run-off.

The sub-centre for zinc presented real run-off measurements performed within a national research programme including results for different materials. One important issue for the future will be to establish norms on how to perform reliable run-off measurements. A discussion of the time dependence of the total run-off followed. Results presented by the participants indicated that the run-off rate could decrease, be constant or increase with time depending on the corroding metal and possibly other factors. The deviation from linearity was not large but could have a significant influence when assessing steady-state corrosion rates.

## 9 Rules for publication and data release

The rules have not changed since the fourteenth meeting of the programme task force may 27-29, 1998, Berlin, Germany, and the full list of rules are given in the minutes of that meeting. In practice this means that the results from the original programme are official but that the results from the multipollutant programme should first be evaluated and considered for publication by the respective sub-centres and then by the Task Force before releasing the data.

The main research centre informed about a submission of an abstract for presenting a paper on corrosion trends to the ASTM symposium on atmospheric corrosion May 8-9, 2001, Phoenix, Arizona. All members where encouraged to publish results and it was decided that an official peer-reviewed publication of the results from the original programme has a high priority.

## 10 Next meeting (subject to confirmation)

The seventeenth meeting of the Programme Task Force is planned to be held in Dübendorf, Switzerland on May 11-13, 2000.

11 Extension of time schedule (active partners underlined)

*May 31, 2000*
German sub-centre: Data set on corrosion attack of copper and cast bronze after 1 and 2 years of exposure to be sent to all members.

*June 15, 2000*
All countries: Input to web site to be sent to the main research centre (see 7b)

*June 30, 2000*
All countries: Final reporting of 2nd year environmental data to be sent to the environmental sub-centre.
All countries: Notice of possible need of limestone samples for trend analysis to be sent to the UK sub-centre (see 5c).
United Kingdom, Germany and Italy: Report on strategy for obtaining precipitation data to be sent to the main research centre.

*July 31, 2000*
All countries: Reply with form on measurements of sun radiation (encl.) to be sent to the Environmental sub-centre.

*August 31, 2000*
Sub-centres: Data set on corrosion attack after 1 and 2 years of exposure to be sent to all members.

*September 31, 2000*
Environmental sub-centre: Compilation of reports on measurements of sun radiation to be sent to all members.

*Varying dates (October 15, 2000 -)*
All countries: Withdrawal of glass specimens after 3 years of exposure and exposure of 1-year trend specimens. The date of withdrawal is individual for each country and depends on the starting date.

*February 28, 2001*
All countries: Final reporting of 3nd year environmental data to be sent to the Environmental sub-centre.

*March 31, 2001*
Sub-centres: Final drafts (35-41) on evaluation of corrosion attack after 1 and 2 years of exposure, trend and environmental data to be distributed to all members.

*June 11-13, 2001*
All countries: Seventeenth meeting of the Programme Task Force, Dübendorf, Switzerland (subject to confirmation).

12 Address list

The updated address list is shown in Annex 1

Annex 1 - Updated address list, Friday 18 June, 1999.

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