

CONVENTION ON LONG-RANGE TRANSBOUNDARY AIR POLLUTION

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

Minutes of meeting for
33rd Meeting of the Programme Task Force

The meeting was held on the 10-12th May 2017. The meeting took place at HAMK Häme University of Applied Sciences in Hämeenlinna - Visamäentie 35 A, 13100 Hämeenlinna, Finland.

1. Opening of the meeting

Jarmo Havula (HAMK) opened the meeting and welcomed the delegates.

2. Introduction of participants

The delegates present at the meeting were:

Johan Tidblad (Sweden), Andrew Gordon (Sweden), Petar-Krešimir Grgurović (Croatia), Ulrik Hans (Switzerland), Marcus Faller (Switzerland), Terje Grøntoft (Norway), Luksa Kraljevic (Croatia), Stefan Brüggerhoff (Germany), Manfred Schreiner (Austria), Aurélie Verney-Carron (France), Marta Segura Roux (IVL, Sweden), Daniel de la Fuente (Spain), Pasquale Spezzano (Italy), Vasile Rus (EGGA, UK), Kateřina Kreislová (Czech Rep.), Tiina Vourio (Finland), Ruth Keller (Germany), Stéphane Heurtault (RTE, France).

3. Overview of meeting objectives and approval of the agenda

Johan Tidblad presented the draft agenda. The agenda was approved by the group.

4. Information from the local organisers

Tiina presented practical information about the meeting.

5. Discussion of 2016 Work plan

The following reports were finalised in 2016 and the meeting was expected to approve the reports, with comments if necessary.

- (a) ICP Materials Report No 78: Results on corrosion and soiling from the 2011–2015 exposure programme for trend analysis (*Johan Tidblad*)

Information was presented from each of the sub-centres:

- Copper - Johan described the high values obtained of Cu corrosion from site 21 Oslo, which meant that the 3rd extra sample was also evaluated.
- Zinc – Markus will check the data from New Haven (longer exposure period) and report to Johan.
- Carbon and Stainless steel – no stainless steel samples were exposed at New Haven, only carbon steel (Katerina).
- Weathering steel – all data is now included in the current report except for New Haven. (Daniel)
- Limestone – the samples are not yet evaluated from New Haven.
- Glass – Aurelie will send the data to Johan.

All data is now present for the report except for New Haven, so the analysis can be completed.

There were no other comments on the report.

(b) ICP Materials Report No 79: Technical manual for the trend exposure programme 2011-2015 (*Johan Tidblad*)

- There were no comments on this report.

(c) ICP Materials Report No 79: Annex A1 Description of test sites (*Johan Tidblad*).

Possible additional contributions by site representatives to be decided and scheduled.

- Johan will update the report regarding the previous Paris test site information.
- ALL: Please provide any information you have for Los Angeles, Belgium, Israel and Estonia sites (site photos also required where possible).
- Stefan B will update the information for Langenfeld and Essen.
- Daniel will send the information for updating of Toledo.
- Tim will send the information for updating of London.

6. Information from WGE and common work plan items 2017, specifically:

(a) Enhance the involvement of countries in the Eastern Europe, the Caucasus and Central Asia (EECCA) (*All*);

- Russia were previously involved but withdrew during 2016. The test rack is no longer operational.
- Any possible contacts within the group for EECCA countries:
 - Terje – Romania were contacted but there is no funding currently. Unsure if they will be able to participate.
 - Katerina – has had contact with Russian Academy of Science. Johan has also had contact with this person. Katerina will send contact information to Johan.

(b) Co-operate with programmes and activities outside the ECE region and provide information on them (*All*)

- ISO WG7 TC156 corrosion of metals and alloys – Johan presented information about corrosion testing (accelerated tests). An update to ISO 9227 salt spray test is published. Annual meetings are planned for this group, with the next meeting planned for Korea, in June 2017.
- Katerina presented information from WG4 (atmospheric corrosion) about field exposures (outdoor and indoor). A presentation was given about the most recent activities – chloride deposition measurements and effects. Various methods of chloride collection (wet candle and dry plate methods) were discussed – the wet candle has been used successfully for longer durations by a Spanish test station on a 3 month basis (Daniel).

(c) Web access and common data portal including compilation of corrosion data (*All*)

- Data shall be made available publically via the ICP Materials webpage in the future. Current ICP webpages have been reviewed by the WGE and commonality

has been investigated. Currently there are no changes required as all reports are available for download. However, the next stage would be a corrosion data database.

- The trend report format is acceptable for this specific data. However, other data types are available so the format may have to be changed in the future.

7. Discussion of 2016-2017 work plan

(a) UNESCO Call for data, status report 2017

1. Introduction (*Pasquale Spezzano*)

Some improvements to the excel file format will be added by Pasquale.

2. Croatia (*Mirna Bojić*)

No data received yet. Luksa will contact Mirna and try to obtain information about the sites.

3. Germany (*Stefan Brüggerhoff*)

Information from German sites will be ready in June 2017. 10 sites will be analysed. Institute of Stone Corrosion have carried out the preliminary work so far.

4. Italy (*Pasquale Spezzano*)

4 sites chosen for Italy.

5. Norway (*Terje Grøntoft*)

Two sites already described in the report with data.

6. Sweden (*Andrew Gordon*)

3 sites have been chosen. Data will be delivered to Pasquale before the WGE meeting in September.

7. Switzerland (*Markus Faller*)

2 sites selected of a possible 7. All data is presented in the report.

8. Other possible additions (*All*)

None.

9. Reporting and time schedule (*All*)

31st August 2017 is the latest date by which all data is required as the WGE have a meeting about the interim report in September.

- Next stages: Pasquale will compile the report and make suggestions for how the project can progress.
 - Risk assessments for different types of stones are required.
 - DRF's need to be assessed for different types of stones.
- For info: Terje has published a paper on calcareous stones – cost savings vs reduction of pollutants. Specific data for each stone type and types of effects were required for the paper.

Comments on DRF's and stone materials:

- Currently two DRF's exist for stone materials. It would be useful to assign a range of use for these DRF's regarding specific stone materials.
- Main reason for renovation/restoration/conservation could be used as a starting point to investigate how we can use our current DRF's.

For info – pending ICP Materials report numbering is as follows:

- 80 Call for data interim report
- 81 Environmental data report
- 82 Trend report

(b) Environmental data report 2014-2015 (*Terje Grøntoft*)

Terje presented an overview of the data gathered so far and each test sites had the opportunity to comment on their data.

- Czech Rep. – Kopisty has missing pH data, however there was no precipitation during this report period, i.e. there are no missing data.
- Germany – Bottrop has missing data. There were problems with measurements so some values could be inaccurate. Chlorides were reported in PM10 field – it is unclear how the data has been reported and why. Stefan will investigate this and report to Terje.
- Italy – ions in precipitation are missing, pH is also missing (but this is because it is not measured).
- Norway – some measurements taken from environmental stations quite far away.
- Sweden – some data is missing.
- Poland, Spain, France, Switzerland and Estonia have already reported all data.
- All data has been compiled now.
- 4 year data can be included in the report to give averages.
- It was proposed that for years 2 and 3 of the exposure period temperature, RH and amount of precipitation could be reported. Each site had the opportunity to comment on this:
 - Countries which can report year 2 and 3 data: Czech Rep., Germany, Italy, France, Switzerland, Sweden (already reported), Norway (need to check), Spain (not 100% if data can be obtained), Estonia (is EMAP site so should be possible), Finland.
 - Poland and Greece - no one present to confirm availability
 - Austria - Mikael coordinating all the data, so he should be contacted by Terje/Johan.

Discussion of which environmental data should be used, IVL or local station data:

- In Sweden: IVL values to be used if “local” measurements are taken at a long distance away.
- Bottrop: for HNO₃ – IVL data should be used
- Norway: use IVL data
- Switzerland: NO₂ & O₃ are local data. Otherwise IVL data is used.

(c) Report on trends in environment, corrosion and soiling 1987-2015

1. Introduction (*Johan Tidblad*) – see also 9.a.2
2. Trends in environmental data 1987-2015 (*Terje Grøntoft*);
 Terje presented diagrams showing trends in the environmental data. “Local” data was used for averages in the calculations (i.e. data taken from local environmental stations, not the IVL sensors).
 SO₂ – all data for all sites compared over time. 1995 included a change of quite a few test sites.
 NO₂ – Steady data.
 O₃ – increasing trend.

HNO₃ – slight decrease (not so many data points)

pH – increasing slowly

T – very slight increase in the trend

RH – no clear trend

PM10 – slight decrease

- It was commented that the data could be presented differently, focussing only test sites that have been present throughout the entire program. How many sites do we have for each parameter and for how long? Terje will investigate.

3. Trends in corrosion 1987-2015

i. Carbon steel and stainless steel (*Katerina Kreislova*)

- The results from 2011/12 and 2014/15 exposures were presented. Higher corrosion rates have been measured in the 2014/15 results, which could be coupled to higher temperatures, RH and precipitation rates measured at some sites. Further analysis is required.

ii. Zinc (*Markus Faller*)

- HNO₃ seems to adversely affect DRF accuracy quite a lot. Further analysis is required to understand why HNO₃ was included previously in DRF's.

iii. Copper and aluminium (*Johan Tidblad*)

- Copper corrosion for the period of 1997-2015 was presented, as the trends from the period between 1987-1997 have already been discussed many times.
- Aluminium corrosion was observed to be more correlated to particulate deposition than SO₂ now than compared to previous data.

iv. Weathering steel & comparison with carbon steel (*Daniel De la Fuente*)

- Proposal: extend the exposure of the 7 year samples an extra year until 2019? This was agreed by the group.
- Berlin samples have already been removed so will not be part of the final data.

v. Limestone (*Tim Yates*)

- No comments were given on Tim's presentation.

vi. Modern glass (*Aurélie Verney-Carron*)

- Proposal: extend the duration of exposure and add materials to soiling study? (Sandstone St Maximin roche fine and marble Carrara).
- A vertical exposure was proposed with the same method of fixing/exposure as for the glass samples.
- Surface preparation of the stone samples will need to be measured prior to exposure to ensure consistency. Cut or polished surface to be considered.
- Triplicate samples were proposed for the exposure.

4. Reporting and time schedule (*All*)

Report 82 Trend exposure will be presented to the WGE in September 2017.

(d) Discussion and decision on 2017-2018 exposure for trend analysis, agreement on

1. Test sites

Samples will be prepared in October so final list of sites is required by August.

- Sweden (2 sites), Switzerland, Norway (2), Bottrop, Vienna, Spain (2), Italy (4), France, Czech Rep (2), Finland, Greece – will all continue using the same test sites as previously.
- Croatia – plans to establish sites in Spilt and Zagreb. Both sites are urban. The Zagreb site is 3km from the city centre; environmental data will be gathered from a meteorological station ca. 300m from the test site. The Spilt site will either be in the city centre or 2km from the city centre; environmental data will be gathered ca. 2km from the city centre.
- Berlin – improved security is required around the test site. Negotiations are ongoing for funding for fencing. A decision is expected after May 2017.
- Cassacia – passive samples from IVL will be used from now on.
- Estonia, Poland, St Petersburg (Russia) – Johan will contact these countries.
- Slovakia – Katerina will contact the responsible person at this site.
- Latvia - will not participate in the trend exposure.

2. Mandatory environmental data

- It is recommended to use passive samplers if the test site does not have a nearby environmental data station.
- Trend exposures: during year 1 and year 4 of the 4-year trend exposure passive samplers should be used.
- During years 1 and 4 of the trend exposures temperature, RH, Gases (SO₂, NO₂, O₃, HNO₃), precipitation (pH and Cl⁻), particles shall be measured and reported.
- Proposal for a new Cl⁻ collection method – Dry plate, wet candle (ISO9225), chloride analysis of IVL particle ions sampler? It was agreed to use the chloride analysis of the IVL particle ions sampler as a measure of chlorides in this exposure period. Test sites are encouraged to carry out tests with wet candle and/or dry plate techniques in parallel in order to check the correlation between the IVL samplers and these methods.

Optional parameters to be collected:

- Conductivity and ions collected in precipitation and PM10.
- Solar radiation data for coil coated samples? Terje will check if it is still possible to collect data available on the internet for use with the test sites.
- During years 2 and 3 of the 4-year trend exposure temperature, RH and precipitation shall be reported if possible.

3. Ordering of passive samplers

- Passive sampling: Marta will send the order form for the samplers to all members of the group.

- The period of exposure for the samplers is 3 months.
- All correspondence with IVL should be directed to Marta from now on instead of Martin Ferm.

4. Materials and their numbering

Unsheltered samples:

- Zinc: 1 year exposures are not very useful, longer exposures are necessary to observe trends. 1 and 4 year exposures (6 samples).
- Weathering Steel: longer term exposures are desirable, 1, 4, and 8 years. No planned start for trend exposures but it is possible if the group decides it is necessary. If there are some test sites soon we can expose some samples there.
- Carbon steel: 1 and 4 year exposures (6 samples).
- Stainless steel: 1 and 4 year exposures (6 samples). The 4 year exposure is a higher priority if space is limited on the racks. Selected test sites only shall be used for stainless steel.
- Limestone: a 1 year exposure is possible. 4 years could be problematic due to the pending retirement of Tim.
- Coil coatings: 0,7 mm zinc-coated steel with conversion coating, primer and top coat. Soiling of samples will be tested. Cleanability is an interesting factor to evaluate for industry. Gloss and colour will be measured before and after cleaning. Exposure will be in an unsheltered position. 1, 4 and X year exposures of two colours (6 samples).
- Copper: 1 year exposure (3 samples).
- Aluminium: 4 year exposure (3 samples).

Sheltered samples:

- Glass: 1 year exposure
- Stone: 1 and 4 year exposure for two materials. Triplicate samples will be used.

5 boxes per test site will be provided by Aurelie – 1 glass, 2 limestone and 2 marble. Surface preparation and marking/labelling of stone materials to be confirmed (Johan will contact Aurelie).

Numbering of samples:

- Previous information about numbering is contained in Table 1 in the technical manual.
- Numbering proposals for the new trend exposures are:
 - 2017-2018: 21 – 23 for 1 year exposure;
 - 2017-2021: 24 – 26 for the 4 year exposure.
- Labelling of coil coated materials is to be confirmed. Most likely it will be an adhesive label applied on the back side of the sample.

Note: handling instructions of the coil coated material will be added to the technical manual.

5. Update of technical instructions (*Sub-centres & IVL*)

- Coil coated materials will be added to the technical manual.
- Johan will distribute information to all of how to best place the samples on the racks.

6. Time schedule

- Start of the exposure will be the 1st October 2017.

Note:

- Sub-centres shall notify test sites when the samples are sent.
- Test sites shall confirm they have received the samples.
- Test sites shall notify Johan that they have started the exposure.

(e) 34th meeting of the Programme Task Force

- Zagreb, Croatia is the proposed location for the 2018 ICP Materials meeting. Proposed dates are 25-27th April 2018. This is subject to confirmation.

8. Medium term work plan (2018-2019)

- UNESCO call for data – interim report due September 2017 then further work with risk analyses and cost analyses.
- Trend exposures – according to Johan’s flowchart detailing the 3 year cycle of work.
- Proposal: a new statistical analysis could be carried out to review the DRF’s: Sub-centres shall prepare the data required in time for the 2018 ICP Materials meeting so that a decision can be made next year on which DRF’s can be updated.

9. Dissemination of results

(a) Scientific publications and presentations

1. Conservation-restoration costs for limestone facades due to air pollution in Krakow, Poland, meeting European target values and expected climate change, Sustainable Cities and Society 29 (2017) 169-177 (*Terje Grøntoft*)
 - Terje presented his work in Krakow using the DRF’s.
2. Air pollution effects during 30 years of research within ICP Materials (1987-2017), Eurocorr 2017, Prague, Czech Republic (*Johan Tidblad*)
 - Proposal: Study of the current parameters affecting corrosion compared to previous years. Comparison between materials could be included.
 - Proposal: Comparison of observed large changes in some material responses at certain sites due to economic fluctuations, i.e. industrial activity and air pollution.

Organisation of the paper:

- Could be structured per sub-centre (material type). Structure of document must be consistent, so a template is required. Johan will distribute the template to the sub-centres.
- Selected sites only could be used. These could be divided per site type – urban or rural (i.e. types of pollution).
- The deadline for the paper is the end of July 2017.
- Materials to be included are Cu, CS, Zn, Limestone.
- For soiling more recent 1 year exposure data could be included.

- The paper could be divided into 1 and 4-year exposures.
- Sub-centres shall provide Johan data in excel format so that he can draw the diagrams in a consistent style.

(b) Other ways of involving scientists outside ICP Materials (*All*);

- This point was not discussed due to time limitations.

(c) Development of web page (*Johan Tidblad*)

- The “old style” website is seemingly “barrier free” to visually impaired persons.

10. Financing of the programme and discussion of relevant H2020 and other European calls.

- No information on current calls was discussed.

Financing for continuation of the ICP Materials work was discussed per country:

- Sweden – 1 year contract with Swedish EPA (environmental protection agency) in place. A frame agreement is likely to be put in place soon to ease longer-term agreements.
- Switzerland – 5 year contract in place.
- Croatia – No current funding, but it is expected to have a contract in place with the EPA. A 1 year contract is expected.
- Norway – 1 year contract is in place.
- Germany – 3 year contract in place from EPA.
- Austria – Financing is currently from other projects within the institute.
- Italy – no current contract with EPA. Voluntary input from exposure sites is currently used to carry out the work.
- Czech Rep. – part-funding from other projects is currently used for ICP Materials work.
- Finland – funding via other projects at the institute is used for ICP Materials work. SSAB will fund the coil coated samples however.

11. Any other business.

- Johan will send Vladimir’s contact information to Manfred.