Minutes of EFC WP 15
Corrosion in the Refinery Industry

Estoril (Portugal)

5 September 2013

Prepared by

François Ropital    Part 1-5
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1  WELCOME
Francois Ropital opened the meeting.

17 persons attended the meeting and briefly introduced themselves. The list of participants is enclosed in Appendix 1.

2  EFC WP 15 ACTIVITIES

2.1 EFC WP 15 activities And Minutes of Meetings
Information on the activities of EFC WP 15; Corrosion in the Refinery Industry, was presented by Francois Ropital. This information can also be found on the EFC web site where the minutes of previous WP15 meetings can be consulted and downloaded. More information is enclosed in Appendix 2.


2.2 Publications from WP15
The following publications from this working party are available:

- EFC Guideline n°46: "Amine Unit Corrosion Survey"

- EFC Guideline n°55: "Corrosion under insulation CUI guidelines"

More information on the availability of these EFC guidelines and how to order these can be obtained with the following web link:

http://www.efcweb.org/Publications/List+of+EFC+Publications.html

Discussion on proposals for revision of these publications:

- EFC Guideline n°55: "Corrosion under insulation (CUI) guidelines".
  An update is planned (see section 3 of this document)

Discussion on proposals for future publications:

- A best practice guideline to avoid and characterize high temperature stress relaxation cracking of austenitic materials.

2.3 Downloading Previous Eurocorr Conference Papers
Papers from the previous Eurocorr conferences (from Eurocorr 2004 to 2012) can be downloaded via the member's pages of each of the national member societies of EFC. The list of EFC member societies is available on the web page:

http://www.efcweb.org/Who+we+are/Members+Societies.html
Please contact your member society for more information on access to these papers.

2.4 EUROCORR 2013

This annual working party meeting was held in Estoril during the Eurocorr 2013 conference "Corrosion control for a blue sky".

The session dealing with refinery corrosion has been held on 3 September. A joint session co-organized with WP 19 (Corrosion of polymer materials) on the behaviour of plastic materials in refineries petrochemical and chemical plants took place on 4 September.

Attendance of these sessions was between 35 and 55 persons, figures that reflects the good attendance of the 2013 conference with nearly 900 participants.

2.5 EUROCORR 2014

Eurocorr 2014 "Improving materials durability: from cultural heritage to industrial applications" will take place in Pisa, Italy from 8-12 September 2014 (Tuesday to Friday). Its web site is:

http://www.eurocorr2014.org/

During this meeting, the proposal of a joint session co-organized with WP 3 (Corrosion by hot gases and combustion products) on High Temperature Corrosion in the Refinery, Petrochemical and Chemical Industries has been discussed and decided.

Abstracts for the refinery session and the joint session are welcomed and the deadline for submission is 13 January 2014. The submission is open.

2.6 EUROCORR 2015

Eurocorr 2015 "Earth, Fire, Water, Corrosion happens everywhere" will take place in Graz, Austria from 6-10 September 2015.

2.7 Collaboration with NACE

Exchange of information between WP15 and the NACE groups dedicated to the same topics are encouraged. Rob Scanlan and John Wodarcyk are the EFC WP15 representatives for the NACE meetings during the annual NACE Conferences and Technical week to inform on the WP15 activities. The minutes of the EFC WP15 and NACE STG 34 meetings are exchanged between Linda Goldberg and Francois Ropital. As mentioned in other paragraphs of these minutes, CUI, plastic materials and the corrosion failure atlas are potential topics of collaboration with NACE.

EFC and NACE presidents decided to co-organize a "Bring on the heat" (BOTH) conference in 2013 in Europe: this conference will take place in Frankfurt Dechema head offices on 14 and 15 November 2013.
2.8  **Next 2014 WP15 spring meeting**

The participants agreed to continue to have 2 working party meetings per year: one in spring and one during the annual Eurocorr conference.

Gino De Landtsheer from Borealis proposed to host the next spring meeting in *Mechelen-Brussels (Belgium)* on *Tuesday 8 April 2014*. Could you save this date.

3  **CORROSION UNDER INSULATION – REVISION OF EFC GUIDELINE**

A revision of the guideline appears useful, especially for old equipment that will not be covered by the future ISO standard. The revision is in progress and proposals of modifications have been received for the different chapters. Stefan Winnik will prepare a draft of the complete revised document for its examination during the 8 April 2014 WP15 spring meeting.

4  **OTHER TOPICS OF DISCUSSION DURING THE MEETING**

The following topics have been discussed:

- Application of thermal spray aluminium (TSA) directly on wet pipe and to manually-cleaned girth welds
- Corrosion of tank roofs,
- Corrosion when reprocessing FAME biodiesels,
- Cracking of Cr-Mo-V welds.

5  **NEXT MEETINGS**

2014 Spring WP15 Meeting
This meeting will take place on *8 April 2014* in Mechelen (Brussels) – Belgium (Borealis offices).

2014 Autumn Full WP 15 Meeting:
This meeting will take place in Pisa, Italy, during the Eurocorr 2014 conference from 8-12 September 2014.
Appendix 1

List of participants
<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin Hofmeister</td>
<td>Bayernoil Raffineriegesellschaft mbH</td>
<td>GERMANY</td>
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<tr>
<td>Gino De Landtsheer</td>
<td>Borealis</td>
<td>BELGIUM</td>
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<tr>
<td>Hermenegildo Ruiz</td>
<td>CEPSA</td>
<td>SPAIN</td>
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<tr>
<td>Pedro Rangel</td>
<td>CEPSA</td>
<td>SPAIN</td>
</tr>
<tr>
<td>Francois Ropital</td>
<td>IFP Energies nouvelles</td>
<td>FRANCE</td>
</tr>
<tr>
<td>Adam Ovington</td>
<td>International Paint Ldt</td>
<td>UK</td>
</tr>
<tr>
<td>Leena Castrén</td>
<td>Neste Jacobs Oy</td>
<td>FINLAND</td>
</tr>
<tr>
<td>Christoph Scharsching</td>
<td>OMV Refining &amp; Marketing GmbH</td>
<td>AUSTRIA</td>
</tr>
<tr>
<td>Johan van Roij</td>
<td>Shell Global Solutions International B.V.</td>
<td>NETHERLANDS</td>
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<tr>
<td>Bert Wolfs</td>
<td>Sitech</td>
<td>NETHERLANDS</td>
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<tr>
<td>Steve Mc Coy</td>
<td>Special Metals / PCC energy EP</td>
<td>UK</td>
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<tr>
<td>Andres Rivero</td>
<td>Statoil ASA</td>
<td>NORWAY</td>
</tr>
<tr>
<td>Anni Visgaard Nielsen</td>
<td>Statoil Refinery, Kalundborg,</td>
<td>DENMARK</td>
</tr>
<tr>
<td>Stephen Brennomatic</td>
<td>Sulzer Chemtech USA</td>
<td>USA</td>
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<tr>
<td>Fred Van Rodijnene</td>
<td>Sulzer Metco Europe GmbH</td>
<td>GERMANY</td>
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<tr>
<td>Johan Sentjens</td>
<td>Temati</td>
<td>NETHERLANDS</td>
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<tr>
<td>Maria Elena Gennaro</td>
<td>Venezia Tecnologie SPA</td>
<td>ITALY</td>
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Appendix 2

EFC WP15 Activities

(Francois Ropital)
### AGENDA EFC Working Party 15

#### Corrosion Refinery Industry Meeting

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>09h45-10h15</td>
<td><strong>Welcome - WP15 Activities (F. Ropital)</strong></td>
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<tr>
<td></td>
<td>- Eurocorr 2014 (Pisa-Italy) sessions and workshops with WP3 (High temperature)</td>
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<tr>
<td></td>
<td>- Eurocorr 2015 (Graz - Austria) sessions and workshops,</td>
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<td>- publications,</td>
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<td></td>
<td>- collaborations with NACE (publications, joint conferences)</td>
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<td>- next meeting: next spring 2014</td>
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<td>- other points</td>
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<tr>
<td>10h15-10h45</td>
<td><strong>Corrosion failures - Topics from the audience</strong></td>
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<td>- WP15 corrosion failure atlas (web page) - new cases to be included</td>
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<td></td>
<td>- Corrosion when reprocessing FAME biodiesels</td>
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<td>- Discussion on cases and questions from the participants</td>
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<td>10h45-11h15</td>
<td><strong>Thermal Spray Aluminium Coatings</strong></td>
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<td>- Application of TSA directly on wet pipe and to manually-cleaned girth welds (S. Brennom Sulzer Chemtech USA In)</td>
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<tr>
<td>11h15-13h00</td>
<td><strong>Corrosion under insulation</strong></td>
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<td></td>
<td>- Status on the revision of the CUI guideline</td>
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<td>13h00-14h00</td>
<td>Lunch break</td>
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<tr>
<td>14h00-15h00</td>
<td>Possible continuation on the CUI guideline revision</td>
</tr>
</tbody>
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### Presentation of the activities of WP15

**European Federation of Corrosion (EFC)**

- Federation of 31 National Associations
- 20 Working Parties (WP)
- Annual Corrosion congress « Eurocorr »
- Thematic workshops and symposiums
- Working Party meetings (for WP15 twice a year)
- Publications
- EFC - NACE agreement (20% discount on books price)

For more information: [http://www.efcweb.org](http://www.efcweb.org)
EFC Working Party 15 « Corrosion in Refinery » Activities

Chairman: Francois Ropital  Deputy Chairman: Hennie de Bruyn

The following are the main areas being pursued by the Working Party:

Information Exchange
Sharing of refinery materials /corrosion experiences by operating company representatives.

Forum for Technology
Sharing materials/ corrosion/ protection/ monitoring information by providers

Eurocorr Conferences

WP Meetings
One WP 15 working party meeting in Spring,
One meeting at Eurocorr in September in conjunction with the conference,

Publications - Guidelines

Publications from WP15

  Update in relation with Nace document 11106 "Monitoring and adjustment of cooling water treatment operating parameters" Task Group 152 on cooling water systems


- Future publications : suggestions ?
  · best practice guideline to avoid and characterize stress relaxation cracking?
Working Party 15 « collaboration with NACE »

- Exchange of minutes of meetings between WP15 and NACE STG34 meetings
- Web cast of the meeting of the NACE TEG 205X Refining Information Exchange at CORROSION 2010 and diffusion to WP15 members
- Joint document EFC n°40 “Prevention of corrosion by cooling in relation with Nace document 11106 "Monitoring and adjustment of cooling water treatment operating parameters” Task Group 152 on cooling water systems

- BOTH (Bring on the Heat Conference)
Frankfurt 14 – 15 November 2013
http://www.efcweb.org/both.html

EFC Working Party 15 plan work 2013-2016

- Sessions with other EFC WP at Eurocorr
  2014 Pisa-Italy (8-12 Sept), Workshop on high temperature corrosion in with WP3 ?
  2015 Graz-Austria (6-10 Sept)
  2016 Montpellier - France (11-15 Sept)

- Update of publications
  - CUI guideline

- New Publications: best practice guideline to avoid and characterize stress relaxation cracking ?

- Education - qualification - certification
  List of "corrosion refinery" related courses on EFC website ?
  Proposal of courses within Eurocorr ?
Information:
Future conferences related to refinery corrosion

- 8-10 October 2013
  ESOPE Paris France
  (Construction technologies, Codes, Standards and European Directives for stationary and transportable Pressure Equipment)

- 12-14 November 2013
  Stainless Steel World conference Maastricht NL

- 9-13 March 2014
  Nace Conference 2014 San Antonio USA

- 8-12 September 2014
  EUROCORR 2014 Pisa Italy

Joint NACE-EFC BOTH Conference
Frankfurt 14-15 November 2013

Bring On The Heat conferences all over the World

The program would include:
- Insulation
- Corrosion Under Insulation (CUI) / Thermal Spray Aluminum (TSA)
- Passive Fire Protection (PFP)

http://www.efcweb.org/both.html
Thank you to Martin Hofmeister and Andres Rivero for proposing new cases.

Corrosion Failures

In course of an investigation, aimed at finding the potential cause(s) of the extraordinary high rate of corrosion in our crude distillation units, we found volatile, short chain carboxylic acids (formic, acetic, propionic and even butyric acid) in side streams and effluent waters. We regularly re-process biodiesel (FAME) containing wastes blended to the incoming crude, originated as pigging sludge from a dedicated FAME pipe and also from off-spec production, we suspect that FAME decomposition products could be at least one source of these volatile acids.

It would be very important for us to know what practices are followed by the partner refineries:
- do they have any FAME containing waste collected in the refinery?
- if yes, do they re-process it together with the crude? Did it cause any corrosion problem?
- If not re-processed what is the recommended way in handling this type of waste?
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Update</th>
<th>Full</th>
<th>Partial</th>
<th>Volume(s)</th>
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<tbody>
<tr>
<td>Chapter 1: Introduction</td>
<td>Y</td>
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<td></td>
<td>S. Winnik</td>
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<td>Chapter 2: Economic Consideration</td>
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<td>S. Winnik</td>
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<td>Chapter 3: Ownership and Responsibility</td>
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<td>S. Winnik</td>
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<tr>
<td>Chapter 4: RBI Methodology for CUI Unit Prioritisation</td>
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<td>H. de Bruyn, J. Van Roij, J. Pugh</td>
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<td>Chapter 5: Inspection/Testing Strategy</td>
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<td>Chapter 6: NDE/NDT Screening Techniques for CUI</td>
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<td>A. Demma</td>
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<td>Chapter 7: Recommended Practice to Mitigate CUI</td>
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<td>S. Winnik, M. McLampros, J. Pugh</td>
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<td>Chapter 8: Design for the Prevention of CUI</td>
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<td>H. de Bruyn, M. McLampros, A. Ovington</td>
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<tr>
<td>Appendices</td>
<td>A. NDE/NDT Techniques</td>
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<td>B. Cost Economic Evaluation</td>
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<td>C. Application of TSA</td>
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<td>D. Use of Protective Guards</td>
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<td>E. Additional Guidelines of the Implementation of CUI Best Practice</td>
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<td>F. Coatings</td>
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<td>G. Quality Assurance</td>
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<td>H. Insulation Material Types and Forms</td>
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<td>I. Cladding/Jacketing Materials</td>
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<td>J. Case Studies</td>
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