

# **Minutes of EFC WP 15**

## **Corrosion in the Refinery Industry**

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Part 1-7

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# 1 Welcome

The meeting was opened by Francois Ropital.

22 persons attended the meeting and shortly introduced themselves. Apologies were received from 20 persons. The lists of the participants and the excused persons are 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 were presented by Francois Ropital. This information can also be found on the EFC web-site [http://www.efcweb.org/WP\\_on\\_Corrosion\\_in\\_the\\_Refinery\\_Industry-design-.html](http://www.efcweb.org/WP_on_Corrosion_in_the_Refinery_Industry-design-.html) where the minutes of previous WP15 meetings minutes can be consulted and downloaded. More information is enclosed in Appendix 2.

### 2.2 Publications

The following publication is available at Maney Editor:

- EFC Guideline no. 40: "Prevention of Corrosion by Cooling Waters"  
<http://www.maney.co.uk/search?fwaction=show&fwid=623>

Two EFC WP 15 publications are in preparation at the editor:

- EFC Guideline no. 42: A Collection of Selected Papers (ed. John Harston).
- EFC Guideline n°46: "Amine Unit Corrosion Survey" (managed J. Harston)

Publication in preparation by WP15 group:

- Corrosion under insulation issues in modern refinery and petrochemical plants. This new guideline has been discussed during the meeting on CUI. The discussions on this guideline are presented in section 6 of these minutes.
- Proposal by Francois Ropital to elaborate a typical refinery failure cases Atlas. It appears that such type of document dedicated to the refinery industry does not exist: the Elsevier corrosion atlas has only few and poorly documented refinery corrosion cases, and the API 571 document gives few information on the failure

cases that are presented. Some more information on this proposal are included in Appendix 3.

The proposed EFC WP15 corrosion atlas will follow the API 571 classification of corrosion phenomena. Francois Ropital will send an inquiry form to the members of the group in order to get an overview of the failure cases that can be collected.

### 2.3 EUROCORR 2005

This annual working party meeting was held in Lisbon during the Eurocorr 2005 conference (EFC event n° 273) "Corrosion control for sustainable development".

Two sessions dealing with refinery corrosion have been held:

Workshop 7 "Corrosion and remedies to fight naphthenic acid corrosion (organised with WP1 "inhibitor"). This workshop contained 1 keynote lecture and 6 presentations which have been attended by 35 persons.

Session N: "Refinery corrosion and failure cases". This session contained 1 keynote lecture (dedicated to celebrate the golden Anniversary of EFC for the refinery corrosion aspects) and 5 presentations which have been attended between 30 and 40 persons.

As 2005 will be the 50<sup>th</sup> Anniversary of the European Federation of Corrosion, a key note lecture will be given on "50 years of corrosion work in the refinery industry".

### 2.4 EUROCORR 2006

Eurocorr 2006 "Reliability management of technical systems" will take place in Maastricht, Netherlands from 25-28 September 2006.

Its web site is <http://www.eurocorr2006.nl>

It has been decided that a joint session will be organised with working party 1 ("Inhibitors") on preventing of corrosion by cooling waters in order to prepare a revision of the EFC 40 Guideline deal with "Corrosion Under Insulation". A part of the session will deal with functional inhibitors (such as drag reduction ones) and another one on monitoring. Prof. Günter Schmit will take charge of the first part and Francois Ropital the second one.

A project of workshop on "Lifetime service remaining evaluation: Smart Systems Designing" has also been proposed in collaboration with WP 8 ("Testing").

It is also been proposed that the "Refinery" session will take into account the CUI problems by presenting selected sections of the CUI guideline that should be available by this time of 2006, in order to launch its issue.

**Abstracts are welcomed and the deadline for submission is 15 November 2005.**

<http://www.eurocorr2006.nl/contributors/information.php#4>

### **3 Electrochemical noise in corrosion monitoring**

A. Cafissi and S. Trasatti (University of Milan) presented their work on this subject. More information is provided in Appendix 4. The advantages of EN analysis in order to identify the type and morphology have been demonstrated. The actual limits of the method lies in the quantification of the corrosion rate. Examples of applications for corrosion evaluation of carbon and stainless steels have been discussed.

### **4 New Technology for Prediction and Assessment of Corrosion in Refinery Operations**

Russell Kane (Honeywell) presented some information on Intercorr activities on ammonium bisulfide corrosion, amine unit corrosion, sulfuric acid corrosion in alkylation process and high temperature crude oil corrosivity. More information is provided in Appendix 5 and can be obtained by contacting Russel Kane

### **5 Ageing materials and failure cases discussion**

#### **5.1 Corrosion erosion of an alloy 825 reactor effluent**

Joanna Hucinska (Gdansk University) presented a failure case of a reactor effluent cooler made of alloy 825 and used in used oil hydrotreatment plant. A brittle fracture happened after 5 months of service. The possible causes of failure were discussed. Hydrogen flux measurements were proposed in order to evaluate the hypothesis of an hydrogen embrittlement. More information are enclosed in Appendix 6

#### **5.2 Metal dusting in platforming CRR furnaces**

The metallographic of a 10 years aged 9Cr-1Mo grade P9 steel furnace tube was presented by Joanna Hucinska (Gdansk University). A carburization was locally detected beneath the inside face of the tube. The precipitation of  $\text{Mo}_2\text{Fe}$  intermetallic phases was detected at the grain boundaries. An exchange of information and experiences between the participants took place on the best practices to operate with aged furnace tubes. More information is enclosed in Appendix 7.

### **6 Corrosion Under Insulation EFC Guideline**

The second part of the meeting was dedicated to the advancement of the Corrosion Under Insulation (CUI) guideline. The current objectives are to produce a consensus European document from WP15 on corrosion under insulation.

## **6.1 Review of the different sections of the guideline**

Section 1 (Francois R.):

This section will be finally revised when the final document will be ready

Section 2 (Andrew K.): Rev 4 has to be performed by Andrew

Case history from various contributors can be added. Chevron-Texaco will add the material presented at EFC and CUI Forums. Others will be expected to contribute to make this section a success;

Section 3 (Staffan O.) : Rev 4 has to be performed

Table with different examples (Scanraf + Pembroke + others?) showing the manpower requirements and size of the program will be included in the next revision of the document

Section 4 (Andrew K.) : no modification

Section 5 : Maarten L. will take charge of this section with an improve of the graph.

Section 6 (Hennie dB.) : no modification

Section 7 (Maarten L.) :

- Need to incorporate a first section dealing with a pragmatic approach for readers of a "base level)
- Need of flow diagrams with loop

Section 8:

Need to be homogenised with section 7. Maarten will update with 3 levels (high medium, low).

- This section should also be addressed to stainless steels.
- Quality and safety section ?

Section 9: it will be reviewed by Maarten . The previous comment of Conoco-Philips will be distributed to Maarten and Stefan.

Section 10: revision and reorganisation will be performed by Stefan

- Put first section 10.7 to indicate that TSA is one solution with after development of TSA benefits (including Total Life Cycling Cost).
- References to be included.

Section 11: Stefan will take charge of this section. Photographs have to be included.

## **6.2 Decisions**

- The technical editor of the guideline is Stefan
- One unique file document will be rebuilt just after the meeting.

- Stefan will reorganise this document and will inform NACE of it during September 2005 NACE Technical Week. Whatever NACE will decide on their own CUI guideline project, Stefan will inform NACE that we will continue on this document in order to publish it in the EFC publication series.

- The next reviewing will be done by the adequate team during a meeting that will take place by the end of November 2005. The location will be chosen in order to be the more easiest to travel for the CUI Guideline team members.

The team is composed of Stefan W., Andrew K, Hennie dB., Maarten L., Rob S. and Francois R.

## 7 Next Meetings

### 2006 Spring WP15 Meeting

The location of the next spring meeting has been discussed. After an email consultation of WP15 members on different proposals of location, a joint meeting with the Nace Italia Refinery group has been decided in order that as many people as possible could join the meeting. The meeting will be co organised with S. Trasatti (Nace Italia section chairman) and it will be hosted by ENI at the **Venezia Tecnologie Centre** (closed to Venice Airport). **The proposed date are 30-31 March 2006.**

### 2006 Autumn Full WP 15 Meeting:

This meeting will take place in Maastricht Netherlands from 25-28 September 2006 during the Eurocorr 2006 conference from 25-28 September 2006.