Minutes of EFC WP 15

Corrosion in the Refinery Industry

Paris (France)

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Prepared by

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Acknowledgement

The EFC WP 15 Refinery Corrosion Group would like to express thanks to Cefracor and EFC Paris head offices for hosting this meeting in Paris.

1 Welcome

Francois Ropital opened the meeting and express thanks to Cefracor and EFC Paris head offices for hosting the meeting.

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

2 EFC WP 15 Activities

2.1 EFC WP 15 Activities & 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 WP15 web site, where the minutes of previous WP15 meetings minutes can be viewed and downloaded. More information is enclosed in Appendix 2.

2.2 Publications

The following publications from WP15 are available:

- EFC Guideline no. 40: Prevention of Corrosion by Cooling Waters.
- EFC Guideline n° 42: A Collection of Selected Papers.
- EFC Guideline °46: Amine Unit Survey.
- EFC Guideline n° 55: Corrosion under insulation (CUI) guidelines.

Future and Updated Publications

Stress Relaxation Cracking

No progress has been made on a project to publish a guideline to avoid stress relaxation cracking failures. This guideline should be an issue from a JIP project that has difficulties to be launched by the high temperature group of the French Cefracor petroleum industry commission. A status update will be provided during the 2011 annual WP15 meeting in Stockholm.

Amine Unit Corrosion

As corrosion in acid gas treatment plants becomes an important issue, especially for the future CO_2 capture and sequestration projects (CCS), an update of the EFC n°46 guideline is considered and will be presented in section 3.2 of this document.

Corrosion-Under-Insulation

An update of EFC Guideline n°55 on Corrosion Under Insulation (CUI) has been discussed in the 25 November 2010 meeting with ENAA and will be included in the agenda of a next meeting where Stefan Winnik (Editor of the EFC n°55 document) could be present. In order to maximise input for the revision of the guideline, a

request for comments will be circulated within the EFC (WP15& WP13) and the UK CUI Forum. Francois Ropital will distribute and collect this survey.

2.3 Downloading Previous Eurocorr Conference Papers

The previous Eurocorr conferences papers (Eurocorr 2004, 2005, 2006, 2007, 2008, 2009) can be downloaded via the members 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/Member+Societies.html

2.4 News from European Federation of Corrosion (EFC)

The start of February 2011 has brought a change at the European Federation of Corrosion (EFC) with the appointment of a new Scientific Secretary/Public Relations officer: Juliet Ippolito succeeded Dr. Paul McIntyre who held this position for the past 14 years.

2.5 Collaboration with NACE

Opportunities for collaboration between EFC and NACE are fully supported by the board of administrators of the two associations.

Exchange of information between WP15 and the NACE groups dedicated to the same topics are encouraged. Rob Scanlan who is the EFC WP15 representative for the NACE meetings, has informed the NACE STG34 members of the WP15 activities during the 2011 NACE Conferences. The minutes of the EFC WP15 are regularly send to Linda Goldberg for NACE distribution.

2.6 EUROCORR 2011

Eurocorr 2011 "Developing solutions for the global challenge" will take place in Stockholm, Sweden from 5-8 September 2011.

The web site for this conference is:
http://www.eurocorr.org/EUROCORR+2011.html

The refinery corrosion session will be on Monday 5 September. The joint workshop with WP3 "High temperature corrosion in refinery and process industries" will take place on Tuesday 6 September. The annual Working Party meeting of WP15 is planned on Wednesday 7 September.

The draft program for the refinery sessions is attached in Appendix 2.

The complete program will be soon on the conference web site.

2.7 EUROCORR 2012

Eurocorr 2012 will take place in Istanbul (Turkey) from 9 to 13 September 2012. Proposals for topics on joint sessions with other Working Parties are still welcome.

2.8 List of conferences with refinery corrosion content

18-22 March 2012
CORROSION 2012/NACE Salt Lake City Website: www.nace.org

20-25 May 2012
High Temperature Corrosion and Protection of Materials - Les Embiez (F)
Web site: http://www.htcpm2012.com/

3 Corrosion of sour gas unit treatment

3.1 Opportunity of duplex use in the amine units for CO_2 treatment (F. Weisang-Hoinard, P. Vangeli Otokumpu)

After a review of the most common corrosion failure types in sour gas treatment units by amines, F. Weisang-Hoinard presented some corrosion results concerning lean grade duplex stainless steels that can combine good corrosion resistance properties, improved mechanical characteristics and lower cost than standard austenitic stainless steels. The slides presented are included in Appendix 3.

3.2 Revision of the EFC n°46 guideline "Amine unit corrosion in refineries"

As corrosion in acid gas treatment plants becomes an important issue, especially for the future CO_2 capture and sequestration projects (CCS), an update of the EFC n°46 guideline is proposed. A task force was launched to start the work that is composed of H. de Bryun, C. Aiello, S. Brendryen, F. Weisang-Hoinard, G. Sielski, C. Laverde, and F. Ropital. The first step will be the preparation by F. Ropital of an inquiry form on experiences of corrosion failures in amine plant. After validation by the task force, the inquiry form will be send to EFC WP3, 13, 15 members and also to experts in energy industries.

4 Mercury corrosion and removal from refinery streams

This topic on mercury contamination of refinery streams was presented by R. Mansfield of Johnson Matthey. First a survey of concentrations of mercury for different oil and gas reserves was discussed. Mercury contaminations remain in several streams from the atmospheric and vacuum distillation processes. In order to avoid upstream catalyst poisoning and liquid metal embrittlement of aluminum and some copper alloys, mercury has to be removed in the streams.

More information is provided in Appendix 4.

5 Naphthenic acid corrosion: an analytical approach

E. Guerrini presented some work performed by Milan University in relation with ENI on naphtenic acid corrosion.: their approach is not only based on the total acidity but also on the conductance and on the naphtenic acids fractions which they extracted from crudes. Corrosion tests have been performed with different fraction

and the results will complete the neural network application that Milan University is developing.

The complete presentation is provided in Appendix 5.

6 Failure cases

6.1 Dpcell orifice flange from an hydrotreater unit

C. Aiello (Consultant) presented the failure case of a Dpcell orifice flange. The failure occurred for several concomitant causes: incorrect execution of the welding without proper PWHT, lack of non-destructive testing and incorrect pressure test.

More information is provided in Appendix 6.

6.2 Unusual corrosion under insulation

The failure of a carbon steel FCC top nozzle has been reported by M. Richez (Total). Two causes are the sources of this corrosion:

- due to the design of the equipment, the carbon steel was not cooled by the ambient temperature creating a high temperature oxidation under the insulation
- the insulation material put in place in was not sufficient (twice the normal quantity was advised on the drawings)

The carbon steel's temperature got up to 600°C creating conditions for oxidation and creep.

The slides are included in Appendix 7.

7 Corrosion under insulation

7.1 Temati presentation on CUI

J. Sentjens (Temati) presented some considerations on Corrosion Under Insulation. Firstly the organisation issue to avoid CUI, the need for insulation expertise and life cycling engineering were highlighted. A review of inspection techniques and insulation materials was also presented.

More information is provided in Appendix 8.

7.2 Update of the EFC guideline n°55 on Corrosion Under Insulation (CUI).

In order to enlarge the area of revision of the guideline, an inquiry will be circulated to the EFC WP15, WP13 and UK CUIForum members in order to have feedbacks on the actual guideline and wishes of improvement. Francois Ropital will distribute and collect this survey.

8 New stainless steels: Sandvik SAF 2707 HD

The properties of this new high grade duplex stainless steel have been presented by G. Sielski (Sandvik). Sandvik SAF 2707 HD has an excellent resistance to pitting crevice and stress corrosion cracking in chloride and sulphide containing environments. It has also a very high resistance to organic acids. Excellent performance has been verified process plant heat exchanger installations.

The slides presented are included in Appendix 9.

9 Water treatment : 3D TRASAR for boiler technology

Nalco has developed a new control system to avoid boiler corrosion and scaling. Different variables can affect a steam boiler system performance: chemical treatment program, contamination events, operational factors. These variables can cause system stresses that manifest themselves as operational problems. The 3D TRASAR program can detect system variations, then determines and delivers the correct program dosage. By providing real time diagnostic capability, the program can reduce scaling potential, pre-boiler corrosion potential, and carryover potential.

The slides presented by V. Beucler are included in Appendix 10.

10 Monitoring : corrosion monitoring and inhibition program to process opportunity crudes

C. Lavarde and A. Pothuaud presented GE's Rigtrax and Predator technologies.

The Rightrax corrosion monitoring system uses permanently installed ultrasonic sensors and permits remote monitoring of restricted or high-temperature areas (350-500°C). It can be successfully used to monitor the Predator treatment program to process and manage high acidic crudes. The Predator system is based on a prediction, protection and detection programs. Case studies for naphtenic acid crude mapping in atmospheric distillation tower, FCC overheads, wet sour gas treated have been discussed.

More information is provided in Appendix 11.

11 Next Meeting

*The annual meeting will take place in **Stockholm (Sweden)** during the Eurocorr 2011 conference. The meeting is planned for Wednesday **7 September 2011.***

The final agenda is in preparation and is open to contributions. It will be sent to WP15 members by 15 July 2010.