Minutes of EFC WP15

Corrosion in the Refinery Industry

Amsterdam (The Netherlands)

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Acknowledgement

The EFC WP 15 Refinery Corrosion Group would like to express thanks to Shell Technology Centre for hosting this meeting in Amsterdam with special thanks to Johan van Roij for organising the meeting.

1 WELCOME & INTRODUCTION

Fred Busch and Johan van Roij from Shell opened the meeting.

Fred Busch presented the activities of the Shell Technological Centre in Amsterdam (STCA). The first laboratories were implanted on the Koninklijke site in 1904. New buildings that are virtually CO_2 neutral were opened in 2009. Currently 1300 persons work in STCA on both upstream and downstream projects and engineering services. Shell has three other technological centres; Rijswijk, Houston and Bangalore. Within the STCA, a Mechanical Materials and Integrity (MMI) department (of around 24 persons) delivers fitness for purpose solutions to mechanical, materials, corrosion, inspection and integrity challenges for projects and assets.

More information on the Shell Technology Center is included in Appendix 1

33 persons attended the meeting and briefly introduced themselves. The list of the participants is enclosed in Appendix 2.

2 EFC WP15 ACTIVITIES

2.1 EFC WP15 Activities & Minutes of Meetings

Information on the activities of EFC WP15, Corrosion in the Refinery Industry was presented by Francois Ropital. This information can also be found on the EFC WP15 website, where the minutes of previous WP15 meetings minutes can be viewed and downloaded. More information is enclosed in Appendix 3.

2.2 Existing 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.

2.3 Future and Updated Publications

Stress Relaxation Cracking
It is intended that this document should be a guideline to avoid stress relaxation cracking failures. WP15 members are participating in a TNO led joint industry project that was launched in April 2012. This project will, at its conclusion, make information available that could be used in the development of a guideline. More information on the project is provided in section 4 of these minutes.

Amine Unit Corrosion
The update of the document has not advanced. A further discussion with WP13 (Oil & Gas Production) is planned on this topic during the Eurocorr 2012 conference in Istanbul.

Corrosion-Under-Insulation
A specific meeting took place in Amsterdam on 25 April 2012 to discuss an update of EFC Guideline n°55 (Corrosion under Insulation). Specific minutes of this meeting will be prepared by Stefan Winnik (Exxon-Mobil Chemicals).

2.4 Downloading Previous Eurocorr Conference Papers

The previous Eurocorr conference papers (2004 - 2010) 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

2.5 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 (Phillips 66) who is the EFC WP15 representative for the NACE meetings has informed the NACE STG34 members of the WP15 activities during the 2012 NACE Conference in Salt Lake City. The minutes of the EFC WP15 meeting are regularly send to Linda Goldberg for NACE distribution.

2.6 EUROCORR 2012

Eurocorr 2012 "Safer World through Better Corrosion Control" will take place in Istanbul, Turkey from 9-13 September 2012.

The web site for this conference is:

http://eurocorr.org/EUROCORR+2012-p-48376.html

The refinery corrosion session will be on Tuesday 11 September (see Appendix 3 for the program), and the annual Working Party 15 meeting is planned on Wednesday 12 September. The complete program is available on the conference web site.

2.7 EUROCORR 2013

Eurocorr 2013 "Corrosion Control for a Blue Sky" will take place in Estoril (Portugal) from 1 to 5 September 2013.

It was proposed that a joint session be organized with WP19 (Corrosion of Polymer Materials) on the behaviour of plastic and composite materials in refineries and petrochemical plants. Francois Ropital will contact Rudolph Morach (WP19 chairman) to discuss this proposal. Contributions from Saudi Aramco, Exxon-Mobil, and others will be investigated.

2.8 Upcoming Conferences with Refinery Corrosion Content

- NACE Corrosion Technology Week 2012 – New Orleans, LA, USA (16 - 20 September 2012)
- NACE CORROSION 2013 – Orlando, Fl, USA (17 - 21 March 2013)

- ESOPE 2013 (European Symposium on Pressure Equipment) – Paris (8 – 10 October 2013)

3 FAILURE CASES WEB PAGE

In order to facilitate exchange on corrosion failures and their remedies, it has been decided during the 2011 WP15 annual meeting, to create an open, dedicated web page within the WP15 page on the EFC website. The first 10 failures cases have been collected. In order to validate these documents, a peer-review team has been created. The following members volunteered to conduct these reviews:

- Martin Richez (Total)
- John Pugh (BP)
- Stefan Winnik (Exxon-Mobil Chemicals)
- Hennie de Bruyn (Johnson Matthey Catalysts)
- Jan Links (DOW Chemical)
- Chris Claesen (Nalco)
- Michael MeLampy (Hi-Temp Coatings Technology)

4 STRESS RELAXATION CRACKING (SRC)

A joint industrial project has been launched by TNO on stress relaxation cracking (SRC). The kick off meeting of this project took place in Amsterdam on 25 April 2012. 21 companies were represented.

The project will be executed over a two year period and will consist of seven work packages. The work packages are:

- WP1: Improved Recommended Practice
- WP2: Modelling & Characterisation
- WP3: Alternatives to PWHT
- WP4: Creep Life Time
- WP5: New Alloys
- WP6: Dissimilar Welds
- WP7: Dissemination of Information

Information on the project presented by Hennie de Bruyn (Johnson Matthey Catalysts) is enclosed in Appendix 4.

5 FAILURE CASES

5.1 High Temperature Hydrogen Attack (HTHA) of Carbon Steel

Recently, there have been several industry reports of HTHA cracking on non-stress relieved, welded carbon steel equipment that are operating below the API 941 curve for carbon steel. In September 2011 API, sent out an alert on this topic.

Martin Richez (Total) presented some slides on the accident in the Tesoro Anacortes refinery, as well as cracking that was detected in a heat exchanger in a Total gasoil hydrotreater unit.

More information is provided in Appendix 5.

5.2 Crack in a FCC Y-Piece

Martin Hofmeister (Bayernoil) presented a failure case of an alloy 800H Y-piece in a FCC unit that cracked in the crotch area. The alloy was sensitised and the intergranular cracking occurred. Stress corrosion cracking by polythionic acids appears to be main cause of damage.

More information is provided in Appendix 6.

5.3 Metallurgical Problems in Cast Steels

Francois Dupoiron (Total Petrochemical) reported leaks that have been detected on some new valves made of cast steel that have qualification certificates. The metallurgical examination indicated that the toughness of the cast steel was very low and that no or very bad heat treatments have been performed. To control all the valves on site, a UT methodology has been validated.

More information is enclosed in Appendix 7.

5.4 Quality Problems with Heat Exchanger Tubes

Francois Dupoiron (Total Petrochemical) presented some difficulties to prevent corrosion by chemical inhibition treatment due to surface defects (pits and under-cuttings) on carbon steel heat exchanger tubes.

More information is provided in Appendix 8.

6 SIC & GRAPHITE EQUIPMENT

Marcus Franz (SLG Carbon) presented the process fabrication of some SiC and graphite equipments; shell and tubes heat exchangers, plate heat exchangers, reactors, columns, piping, pumps, etc. Some applications have also been discussed such as HCl synthesis with heat recovery. Another example is preheating of combustion air with flue gas.

More information is enclosed in Appendix 9.

7 WATER TREATMENT

7.1 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, and operational factors. The 3D TRASAR program can detect system variations, then determines and delivers the correct program dosage. A plant case study from a gas production unit has been presented by Valerie Bour-Beucler in order to decrease the risk of silica scaling in the boilers.

More information is provided in Appendix 10.

8 CORROSION MONITORING

8.1 Corrosion Monitoring in a Sour Water System

The GE Rightrax corrosion monitoring system uses permanently installed ultrasonic sensors and permits remote monitoring of restricted or high-temperature areas (350-500°C). Claudia Lavarde (GE S&I) presented the application of this monitoring system in a sour water stripper system at the Essar Stanlow refinery. 20 permanent monitoring locations have been selected in the sour water stripper system, providing cost effective information for corrosion monitoring.

More information is provided in Appendix 11.

8.2 Monitoring using Permanent Guided Wave Sensors

Alessandro Demma (Guided Ultrasonics Ltd) gave information on the application of permanent guided wave sensors to monitor corrosion of long pipelines. After a presentation on the principles of guided wave ultrasonics and on the technique sensitivity, applications for buried pipelines and crossing pipes have been discussed.

More information is provided in Appendix 12.

9 NEXT MEETING

*The WP15 annual meeting will take place in **Istanbul (Turkey)** during the Eurocorr 2012 conference. The meeting is planned for Wednesda**y 12 September 2012.***

The final agenda is in preparation and is open to contributions. It will be sent to WP15 members by 15 July 2012.