

## **EUROPEAN FEDERATION OF CORROSION**

### **Working Party 13 - Corrosion In Oil & Gas**

#### **MOM of the Estoril Business Meeting**

**Wednesday 4<sup>th</sup> September 2013**

**10:00 – 13:00,**

**Estoril**

Michel Bonis and Jean Kittel, Chairman and vice-chairman of WP13 opened the meeting at 10:00 and welcomed the members of WP13 attending the meeting.

The number of registered attendees to the Business meeting is of 68.

Michel Bonis expressed particular thanks to all speakers of the successive sessions led by WP13 and to Bob Badrak and Mohsen Achour as NACE representatives and co-chairmen of the 2 joined NACE – EFC sessions.

## **1. General Information**

### **New EFC WP13 Chairmanship**

Steve Paterson from Shell has been elected as the new Chairman of the EFC 13 Working Party. Jean Kittel from IFP Energies nouvelles shall remain as a vice chairman for one more year.

Michel Bonis welcomes Steve and commits himself to provide all necessary support as needed. The joined MOMs are among his last formal action as former Chairman.

### **WP13 membership**

The list of WP13 membership has been updated further to a review of wishes of previous members and from new comers from this business meeting. The present number of members is of 255.

*It is reminded that the past and present policy of WP 13 is to include all interested members from all countries, with no limitation to the sole ones which Corrosion professional societies are funding EFC. It is however reminded that, should a formal vote be needed, only 2 nominated members of funding professional societies of EFC should vote.*

### **Eurocorr 2013 (preliminary conclusions)**

Though exact number of participants was not known at the time of the Business Meeting, the number of attendees looks being a new top among all past EFC conferences.

M. Bonis indicates how successful and pleasant the place and the organisation have been during the whole congress and how the assistance to sessions and events has been supportive.

As for previous years, there have been WP13 and joint NACE/ WP13 sessions during the whole duration of the Congress, with a wide and regular attendance of 40 to 80 people in general, the maximum having exceeded 100 persons. 39 papers were presented:

- Quite a number of interesting papers on the characterization of corrosive environments
- Less papers on martensitic materials and more on nickel alloys than during previous Eurocorr.
- Growing interest on fatigue-corrosion mechanisms,

**Thanks to the organizing committee and to all speakers, only 2 papers have been cancelled and there has been no formal no-show (i.e. unannounced ones).**

M. Bonis indicated that a great effort had been devoted with C. Fowler to organize an ISO 15156 educational workshop (Chris Fowler and Derek Milliams as animators) the day before the start-up of the Congress. Unfortunately it had to be cancelled because of a too low number of registered participants.

## **Eurocorr 2014**

Eurocorr 2014 conference will be held from the 8<sup>th</sup> to 12<sup>th</sup> of September, 2014 in Pisa, Italy. Joint sessions with NACE on Sour service and Corrosion/ inhibition and monitoring will continue being organized.

Papers have to be submitted on the Eurocorr/2014 web site <http://www.eurocorr2014.org/call.htm> before January 13th, 2014.

## **NACE 2014 – San Antonio**

Corrosion 2014 will be held in San Antonio 9<sup>th</sup> to 13<sup>th</sup> March 2014. Exchange forum between NACE and EFC will probably be organized on Materials in Oil & Gas and on corrosion, inhibition and Monitoring. WP13 members will certainly be asked for informal presentations during these exchange forums.

### **Possible new activities:**

Michel Bonis reviewed new potential activities for WP13, as long as a wide interest is formulated. Tentative topics:

- **Corrosion monitoring:**

- The management side (organisation, data management, reporting, alarms and KPIs, decision processes...)
- Moving from intrusive to non-intrusive monitoring.

M. Bonis indicated that a detailed & practical document on corrosion monitoring is under preparation at CEFRAFOR (France), which might be communicated in 2013. The part dedicated to the management side might be used as a basis. What's done at NACE has also to be documented (action M. Bonis, Orlando 2013).

- **Testing methodologies:**

- The topic on "testing methodologies of oil soluble corrosion inhibitors" has not shown a significant interest → Abandoned
- "SSC/ SCC testing of super-martensitic SS": A topic of potential interest, from comments made during the Business meeting.

- **Practical guidelines on corrosion mechanisms or on corrosion control solutions:**

- The idea is to issue short documents ( 3 – 4 pages), for others than the sole corrosion community (designers, suppliers, operators...) in a "corrosion awareness" approach
- Few topics considered: Corrosion monitoring, CO2 corrosion, TLC, welding of duplex SS (see here after

- Should be inspired by documents issued by the Energy Association in UK.
- Should provide reference to relevant standards.

WP 13 members are invited to think about these possible topics and revert to chairmen to give opinions, background and hopefully to volunteer taking actions to make them running.

## 2. Activities of Working Groups

There has been a very limited activity on working groups this year, because of the heavy work load of all interested participants.

As regards the planned work on well fluids, the question was raised whether the work should be contracted, as it had been very successfully done for the Green Book on the corrosion management of pipelines. The group is asked to envisage this solution.

The work at NACE on the 4PBT NACE standard is commented by G. Hinds in § 3.

A major part of the Business meeting has been dedicated to new possible activities via work groups (see general presentation from WP13 chairman in appendix 1)..

As a preliminary, M. Bonis highlighted that the high work load and limited availability of members is certainly a long term reality which must be acknowledged. As such WP13 should only focus the activity of working groups to essential subjects, of major interest for a significant number of members: Better a very few groups working well than a large number not progressing.

M. Bonis reminded few topics already mentioned, in order to evaluate whether they might interest a number of members:

- **Corrosion monitoring, from a management point of view** (objectives, responsibilities, data acquisition & analysis, KPI & alarms, corrective actions...).
  - M Bonis indicated that a document is under preparation at CEFACOR, which might constitute a basis. When completed the part related to the management side shall be translated and submitted to interested people.
  - The question was asked whether this was already covered by other standards. M. Bonis indicated that, to his present knowledge it was not, as most documents are more dealing with monitoring solutions and methodologies.
  - S Olsen indicated that the limit with the overall corrosion management is not so clear and so does not see a key interest in such topic. Same from A Kopluku.
  - M. Achour also envisages a confusion with corrosion mitigation,, as long as chemicals injections are part of corrosion monitoring activities.
  - Representatives from companies dealing with integrity topics express a potential interest, as part of wider integrity topics.
  - **It is finally concluded that the topic is not mature enough and not essential enough to constitute a working group. The CEFACOR document shall however be translated (action M. Bonis) and circulated for further discussion at a next BM.**
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- **Sensitization and education on corrosion:**
  - M. Bonis highlights the potential interest in issuing educational short guidelines on good and bad practices, what to do, how to do and why... in the form of short pages (1 or 2 pages. Such educational document should be mostly dedicated to non specialists. The format might be inspired from short informative documents issued by the Energy Institute.
  - S. Paterson indicates that Shell as internal documents e.g. on installation and removal of coupons/ probes. More generally he indicates the potential benefit starting from existing documents.

- **In conclusion, there is not much instantaneous interest in the room. There is still a need to think more on it, and more precisely to propose a few topics to start with.**
- **Up-dating EFC documents n° 16 and 17:**
  - S. Olsen indicates the need to review and up-date of EFC 16 and 17 documents, with new elements on testing methods, evaluation criteria...
  - **This is certainly one of the activities which show the major present interest within the WP13 community. A priority should certainly be given to this activity.**
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### 3. Technical presentations

#### “Challenges for localized corrosion and inhibition in sour systems” - , Rolf Nyborg, IFE

See presentation in appendix 2.

**Rolf** made a review of various studies carried out at IFE on H<sub>2</sub>S + CO<sub>2</sub> corrosion and on its control with pH stabilisation and with corrosion inhibitors. This review was particularly made by comparison with sweet environmental conditions ( no or low H<sub>2</sub>S content), under which the mechanisms and corrosion behaviours are better known

Rolf mostly points out the difficulty to predict the critical conditions leading to a severe localized corrosion under sour conditions. The following effects, observed during various studies, are particularly highlighted:

- The more detrimental role of deposits (inert as sand, conductive as iron sulfide and reactive as sulfur) towards localized corrosion in sour conditions, when compared to sweet ones,
- The ability of inhibitors, if not well selected or injected at a too low dosage, to promote this localized corrosion,
- The observed negative effect of glycol towards H<sub>2</sub>S + CO<sub>2</sub> corrosion, particularly when combined with pH stabilization.
- The lack of dedicated testing methodologies for evaluating the sensitivity to localized corrosion under sour conditions.

The discussion mostly turned around whether the field experience supported the said tendency to localized corrosion due to solid accumulation:

- G. Hinds indicates less experience on Under-deposit corrosion under sour conditions than under sweet ones.
- Rolf says that it depends on the considered deposit, sandf being the less critical and sulfur being the worst.
- M. Bonis indicates that field experience proves lots of severe corrosion problems associated with iron sulfide accumulation and also with sulfur.

#### “Experience with the Direct Assessment methodology” - Daniele Giannone, Patrizia Fassina

See presentation in appendix 3.

**Daniele** summarizes the 4 successive steps of a Direct Corrosion assessment applied to internal corrosion and to pipelines:

1. Pre-assessment
2. Indirect inspection
3. Detailed examination
4. Post Assessment

He reminds that this type of assessment is particularly dedicated to equipment which can hardly be subjected to a complete inspection (e.g. non piggable pipelines).

He then presents two cases of application on 2 pipelines operated by ENI.

In conclusion, the availability of relevant and well documented pipeline data over the field life (i.e. historic and actual data) is essential to a satisfactory assessment. The amount of inspection data finally available is also of key importance.

The discussion mostly turned around the fact that this methodology is indeed a way to formalize an assessment when lacking of inspection data. On the other hand this solution might hardly reduce the uncertainties and risks to the same extent than when a complete inspection is carried out.

### **“Pitting in four-point bend specimens – what is the significance?” – Garreth Hinds, National Physical Laboratory (NPL)**

Presentation included in appendix 4.

**Garreth** first states the progress done at NACE on rev. 3 of the NACE 4P Bend test document. Comments made by Ph. Dent have been appreciated and included. A final version shall be distributed in nov 2013, for final discussion at NACE 2014.

The presentation then focused on the potential effect of pitting on the response to the FPBT, as pits are currently acting as crack initiators. Test results indicate a strong time dependence, with a low sensitivity to pitting over 30 days and a strong dependence over 90 days: 30 days may thus not be sufficiently conservative to reproduce the transition from pit to crack.

S. Olsen comments however that there is not yet enough data to support such a change of pass/fail criteria. Service experience says that present criteria are already appropriate. Changing would probably induce excessive conservatism.

### **“NACE TM0177 method A: an update”; Jean Kittel IFP-EN and “O2 contamination during SSC/HIC tests”, Carol Taravel-Condat, Technip.**

Presentation included respectively in appendix 5 & 6.

**Jean** presented a review of factors applied to NACE TM0177 method A testing conditions which may or may not induce experimental scattering, hence which might need to be better controlled in a new version of this standard. The most significant factors are among the following:

- Cutting and machining tools used
- Quality of the stress application and measurement
- pH, pH drift and over-buffering with organic acids
- Dissolved oxygen and oxygen entries.

In conclusion it is proposed that test results on this subject should be shared with NACE and EFC members. A short paper summarizing the important parameters to be controlled might also be issued.

Carol made a specific presentation on oxygen residuals measured during a SSC or HIC tests at low H<sub>2</sub>S partial pressures, depending on the type of plastic/ elastomeric tubes used, the quality of the CO<sub>2</sub> used and the enclosure of the pump and cell inside N<sub>2</sub> bags. Norprene tubes are among the most critical sources of contamination, with residual oxygen as high as 100 ppb. The quality of CO<sub>2</sub> is also of critical importance. Last but not least, extreme mitigation measures are needed to achieve less than 10 ppb (N<sub>2</sub> boxes needed)

During the discussion there is an overall agreement that 10 ppb is certainly a challenge for a lot of laboratories performing H<sub>2</sub>S tests. Improvements to NACE TM0177 is deemed useful on this subject. Whether 10 ppb is needed or not also comes as a question.

## 5. The Antikor Award: post BM event

Antikor awards a prize for the best lecture by a young presenter within WP13 sessions. As the Business meeting was held before the end of Eurocorr, it has been given at the end of the last session on Thursday 5<sup>th</sup>.

This year the award was attributed to Gaurav Joshi (Corrosion & protection Centre, University of Manchester) for the following paper: "Elucidating sweet corrosion scale".

Professor Muratov of Antikor awarded a certificate and a cash prize to Gaurav.

Congratulations!



## 1. AOB & Close of Meeting

No other business was brought by the attendees.

Before closing the meeting, Michel Bonis wishes the best to Steve for his new Chairmanship.

# **Appendix 1**

## **WP13 business meeting**

## **Appendix 2**

### **Challenges for localized corrosion and inhibition in sour systems**

## **Appendix 3**

# **Experience with the Direct Assessment methodology**

## **Appendix 4**

**Pitting in four-point bend specimens – what is the significance?**

## **Appendix 5**

### **NACE TM0177 method A: an update**

## **Appendix 6**

### **O2 contamination during SSC/HIC tests**