Corrosion Engineering Division

Minutes of Nuclear Corrosion Working Group

The 6th meeting of the Corrosion Engineering Division’s Nuclear Corrosion Working Group was called to order at 13:30 pm on 17/4/2013 at The Centre, Warrington, by Nick Smart.

Those Present:

Nick Smart, (AMEC Chair) Stuart Lyon (Manchester University)
Robert Winsley (NDA) Paul Manser (Deepwater EU Ltd)
Chris Miles (Sellafield Ltd) Peter Philipp (Consultant)
John Kyffin (Sellafield Ltd)

Agenda

1. Introductions and adoption of agenda
2. Minutes from last meeting and review of actions
3. Reading list for new entrants
4. News from EFC, NACE, WCO
5. Technical information exchange
6. Future activities
7. AOB
8. Next meeting

1. Introductions and adoption of agenda

Each attendee introduced themselves and the agenda was agreed.

2. Review of last meeting

The majority of the last meeting held at the Birmingham Motorcycle Museum in April 2012 was devoted to a discussion about MIC issues in the nuclear industry.

The main action was for members of the group to provide contributions to the nuclear corrosion reading list which was being compiled by the group.

3. Reading list for new industry entrants

NS circulated paper copies of the draft reading list for comment. A number of suggestions were made for additional headings in the document. NS would make the list available by download from the ICorr web site and email it to non-members so that they could make additions that would be returned to NS.
**Action:** Members to submit contributions for the reading lists to Nick Smart, who will update the document.

4. **News from EFC, NACE, WCO**

A copy of the latest minutes from EFC WP4 (Nuclear Corrosion) were reviewed and they are attached to these minutes.

5. **Technical information exchange**

Paul Manser described the Nu-Bolt and I-rod devices that his company sell for minimising the effects of crevice corrosion for pipe supports. Details of the products are shown in the attachments to these minutes. There was some discussion about the mechanism for the operation of these devices.

6. **Future activities.**

The Chair invited members to suggest activities for a year hence, by e-mail.

7. **AOB**

None

8. **Next meeting**

The next CED Working Day was scheduled for Leeds in Spring 2014. The meeting closed at 14.30.

**Actions**

Members to submit contributions for reading lists.

Members to suggest activities for the Spring 2014 working group meeting.
MINUTES OF THE WP4 FALL MEETING
HELD IN SHERATON ISTANBUL MASLAK HOTEL AND CONGRESS CENTER
ISTANBUL, TURKEY
WEDNESDAY, SEPTEMBER 12TH, 2012

Written by:
Benoît Gwinner

Diffusion:
Present and apologized participants
Roman Bender (EFC Scientific Secretary)
Juliet Ippolito (EFC Public Relation Officer)
Ines Honndorf (EFC Website)
Attendance:

Odile De Bouvier EDF, France  
Damien Féron CEA, France  
James Grosvenor Rolls-Royce + 10M3, United Kingdom  
Benoît Gwinner CEA, France  
Renate Kilian AREVA NP GmbH, Germany  
Christina Lilja SKB, Sweden  
Raul Rebak GE Global Research, USA  
Stefan Ritter PSI, Switzerland  
Marion Roy CEA, France  
Marco Wehrfritz GRS mbH, Germany

Apologies for absence received from:

Mylène Belgome CEA, France  
Robert Cottis University of Manchester, UK  
Thierry Couvant EDF, France  
Frank Druyts SCK-CEN, Belgium  
Miroslava Ernestova NRI Rez, Czech Republic  
Dolores Gomez Briceño CIEMAT, Spain  
Catherine Guerre CEA, France  
Anders Jenssen Studsvik, Sweden  
Torill Marie Karlsen HRP, Norway  
Valérie L’Hostis CEA, France  
Stuart Lyon Manchester University, UK  
Jan Macak Institute of Chemical Technology, Czech Republic  
Virginia Madina Arrese Tecnalia, Spain  
Anders Molander Studsvik, Sweden  
Cristiano Padovani NDA, UK  
Ellen Pavageau EDF, France  
Bo Rosborg Rosborg Consulting, Sweden  
Peter Scott Consultant, France  
Hans-Peter Seifert PSI, Switzerland  
Nick Smart AMEC Nuclear Holdings Limited, UK  
Marc Vankeerberghen SCK-CEN, Belgium  
Ian Woolsey Morson International, UK
## Summary:

1. Opening and approval of the agenda  
2. Approval of the minutes of the Stockholm 2011 Fall Meeting  
3. EFC internal matters  
4. EFC WP4 Awards & Exchanges  
   4.1. Poster prize  
   4.2. Oral prize  
   4.3. Honorary Medal  
   4.4. Visits/exchanges of "young" engineers and researchers  
5. EFC WP4 publications  
6. EFC WP4 events  
7. EFC WP4 Website  
8. EUROCORRs  
9. Missing items, conclusion and closure

## Enclosures:

- Document available only on the private space of the EFC WP4 website, for WP4 Members
  - Annex 1 Agenda of the Istanbul meeting
  - Annex 2 Slides presented by D. Féron at the Istanbul meeting*
  - Annex 3 Proposed rules for Poster Prize, Oral Prize and Honorary Medal of the WP4*
1. **OPENING AND APPROVAL OF THE AGENDA**

D. Féron opened the Fall Meeting and thanked the audience for coming. The agenda was presented and approved, as no comments were made.

2. **APPROVAL OF THE MINUTES OF THE STOCKHOLM 2011 FALL MEETING**

The minutes were sent by e-mail in July 2012. As no comment was received by D. Féron, these minutes were approved. From now, D. Féron proposed to approve the future minutes by e-mail (approved by the audience).

3. **EFC INTERNAL MATTERS**

A short presentation of the WP4 (history, objectives, rules) was made.

An e-mail was sent by M. Belgome by mid-August to update the member list (120 members in the previous list established in 2008): 40 were not good and 35 responses were received. R. Kilian said she had not received the e-mail.

D. Féron presented the objectives of the next 3-year plan (2012-2014):

- To provide links between European teams and EU funded programs in nuclear corrosion field, with an opening on to the world
- To initiate and stimulate opportunities of exchanges on scientific and technical subjects related to nuclear corrosion, particularly on today’s main nuclear research areas: waste systems, water reactors, generation IV and fusion reactors
- To promote corrosion science and technical developments by events such as seminars, workshops, publications, ...

Among other things, it is proposed to integrate a Workshop of the European PERFORM60 program to EUROCORR’2013.

4. **EFC WP4 AWARDS & EXCHANGES**

The following proposals were done to "reinforce" actions of the 3 year plan (from the Stockholm meeting):

- Prizes: one for "poster" and one for "oral" communications
- "Honorary medal" of the Nuclear Corrosion Working Party
- Visits/exchanges of "young" engineers and researchers

4.1. **Poster prize**

- In EUROCORR’2012, 10 proposals for a poster presentation were done by the EUROCORR Scientific Comity. Only 03 authors accepted to present their work as a poster. Only 01 was effectively presented during EUROCORR’2012. As a consequence, the best poster price was not given in 2012.
- The criteria for the selection of the best poster were presented (approved).
- S. Ritter asked if there was a sponsor for the poster price. It seemed to be a good idea.
- It is asked if a name could be given to the poster price. Several suggestions were made: "Coriou Prize", "2013 Working Party on Nuclear Corrosion Prize". D. Féron is open to others suggestions.
- "The Jury for the award will be composed of three persons including the Vice-Chairman of the EFC WP4 (or a designed representative) and two other members chosen during the meeting of the EFC"
WP4 that immediately precedes the conference or by an Email ballot prior the EUROCORR and organized by the Vice-Chairman. The choice of the Jury could appear to be too restricting and could evolve in the future.

- The proposed rules for Poster Prize are enclosed as an Annex to these minutes and are open to any evolution.

4.2. Oral prize

- The proposed rules for Oral Prize are similar to those for the Poster Prize. These rules are enclosed as an Annex to these minutes.
- "The Jury for the award will be composed of the Vice-Chairman of the EFC WP4 (or a designed representative) and the chair(s) of the nuclear corrosion session(s) and of the workshop(s) supported by the EFC WP4".
- The addition of a limit age was discussed. This appeared to be too restricting and it may be difficult to know the age of all the participants, but everybody agreed with the fact that the Oral Prize should be awarded to a "young researcher" (without precise limit).
- A suggestion was proposed for the prize (M. Roy): a cheque for buying an EFC scientific book. D. Féron will ask the new EFC Series editor to know if it is possible.

4.3. Honorary Medal

- The proposed rules for Honorary Medal of the WP4 are enclosed as an Annex to these minutes. The point 6 will be modified as follows: "The recipient of the award is designated by a Jury presided by the Chairman of the EFC WP4. The Jury shall consist of the Chairman and the Vice-Chairman of EFC WP4 and three members nominated by EFC WP4 members."
- Everyone agreed to the necessity to find a sponsor. The research of such a sponsor is open to all members. General Electric could agree (P. Rebak), but D. Féron would prefer a European Company. R. Kilian (AREVA) proposed to ask their French colleagues.
- A name for the Honorary Medal has to be chosen; "Coriou Medal" was proposed.
- D. Féron proposed to discuss these points (sponsor and name) during the next Spring Meeting of the EFC WP4 (see point 6.).

4.4. Visits/exchanges of "young" engineers and researchers

- A Swedish proposal (B. Rosborg) could finally not be done in 2012. It is reported to 2013.
- D. Féron suggested exchanges in relation with the Société Française d’Energie Nucléaire (SFEN).
- R. Kilian explained that such visits/exchanges (in general) are not successful because of the language difficulties and the time cost.

5. EFC WP4 PUBLICATIONS

In addition to those presented in the slides, S. Ritter mentioned that a special issue will be edited in Corrosion Engineering Science and Technology at the end of 2012.

The following publication is cancelled: "Corrosion issues in nuclear industry today", Springer Publishing, (Th. Couvant, S. Ritter and B. Kursten), then called "Degradation, modelling and mitigation of SCC in LWRs".
6. EFC WP4 EVENTS

✓ The next annual ECG-COMON meeting will be organized in June 10-11th 2013 in Paris. S. Ritter proposed that the next Spring Meeting will be organized the afternoon. Two main subjects will be discussed: the Medal awards (see point 4) and the organization of the Summer School (see below).

✓ The dates of NUCPERF 2012 given in the slide n°15 are false. The right ones are November 12-14th, 2012.

✓ The 5th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems (LongTermCor2013)" will be organized for the first time in Japan (October 06-10th, 2013).

✓ Summer School "Nuclear Corrosion": A. Legat (Slovenia) offered to organise the 2nd Summer School. For the choice of the date, he explained that if the decision to organize such a Summer School is taken in 2012, the School could not be organized before 2014 (August?). S. Ritter said he has already built a program for the school. The organization this Summer School "Nuclear Corrosion" will be specifically discussed during the next Spring Meeting.

7. EFC WP4 WEBSITE

The WP 4 website is described and shown. It is updated frequently thanks to S. Ritter. The audience is encouraged to pass by from time to time and/or feel free to send events or any other useful information to [S. Ritter](http://www.efcweb.org/Working_Parties-p-104085/WP_4.html).

A restricted area (for members only) has been added to the WP4 website. The password provided only to members is given by S. Ritter on request.

D. Féron expressed his thanks to S. Ritter for taking care of the WP4 website.

8. EUROCORR

✓ EUROCORR’2013, 01-04 September, Lisbon (Portugal). D. Féron awaits proposals during the next months concerning the organization of a special Workshop during EUROCORR 2013.

✓ EUROCORR’2014, 08-12 September, Pisa (Italy)

✓ EUROCORR 2015, 06-10 September 2015, Graz (Austria)

9. MISSING ITEMS, CONCLUSION AND CLOSURE

The meeting is closed as no other point is raised.
Enclosure 1:

✓ Annex 1 Agenda of the Istanbul Meeting
Fall meeting of the Nuclear Corrosion Working Party (EFC WP4)

Wednesday, 12 September 2012 (16h10-18h)

Sheraton Istanbul Maslak Hotel and Congress Center, Room “Mars”
Istanbul, Turkey

(Information are given on the Eurocorr website http://www.eurocorr2012.org)

The proposed agenda is the following:

1. Opening of the meeting, apologies for absences and approval of the agenda

2. Approval of the minutes of the Stockholm 2012 fall meetings

3. EFC WP4 internal matters
   • Short presentation of the EFC WP4
   • The 3 years plan
   • WP4 member list

4. EFC WP4 Awards & Exchanges

5. EFC WP4 Publications
   • Books & special issues already published
   • Future publications

6. EFC WP4 past events

7. EFC WP4 future events

8. EFC WP4 website

9. EUROCORR’s

10. Missing items

11. Closure
Enclosure 2:
Document available only on the private space of the EFC WP4 website, for WP4 Members

✓ Annex 2. Slides presented by D. Féron at the Istanbul meeting
Enclosure 3:
Document available only on the private space of the EFC WP4 website, for WP4 Members

✓ Annex 3 Proposed rules for Poster Prize, Oral Prize and Honorary Medal of the WP4
I-Rod Clip™ (or I-Clip) for cradles and saddles
I-Rod® pipe supports

The I-Rod Clip attaches to new or existing saddle clamp-style supports, eliminating crevice corrosion.

The I-Rod Clip (also called I-Clip) is an individual pipe-support clip designed for installation on the inside diameter of a pipe saddle. The clips are mechanically held in place by the weight of the pipe and an adhesive strip, and are easily retrofitted along existing pipe runs. New Grinnell and cradle-style supports can also be easily fitted with I-Rod Clips, and many pipe support manufacturers have begun to offer I-Rod Clips pre-installed in each new support.

Correcting a very old problem

Traditional neoprene pads and other rubber interfaces that were initially used in these applications have proved disastrous for operators by actually promoting the crevice corrosion they were designed to prevent. Pipe support designers have long believed that metal to metal contact is the source of most pipe support corrosion, but the real culprit is the crevice that traps water and holds it in contact with the pipe. Pads made of rubber or fiberglass are easily penetrated by water, and once inside, the moisture is held tight against the pipe by the pad. I-Rod Clip eliminates the crevice, so water simply evaporates. It also eliminates metal-to-metal contact, which accelerates corrosion when wet.

Made from the right material

The Clips are made from a variety of materials to suit the requirements of the application. Standard I-Rod clips are made from I-Rod thermoplastic, the same high-impact material used with our durable I-Rod brand pipe supports. For elevated temperatures and large weight loads, we also offer I-Rod HT material and several grades of PEEK, which are specified for extreme temperatures. Applications include pipe-cradle retrofits, large-diameter band clamps, concrete or timber pier supports and high-load riser clamps.

Half-round shape

The half-round shape minimizes contact between the pipe and the support, eliminating the crevice. Keeping water out keeps corrosion from forming.

Maintenance

I-Rod Clip also provides an electrically-isolated stand-off between the pipe and the supporting beam or saddle clamp, which allows for easy maintenance and inspection while preventing galvanic corrosion between dissimilar metals of the pipes and supports.

Durability

The I-Rod Clip has excellent compressive strength and a very low friction coefficient, ensuring reliable service for as long as the pipe requires it.

More info at www.stoprust.com
Nu-Bolt™ assembly
I-Rod® pipe supports

Nu-Bolt has been in service for over twenty years without any reported corrosion failures.

Designed by corrosion engineers, the Nu-Bolt assembly combines half-round I-Rod supports with modified pipe U-Bolts. A variety of corrosion-resistant treatments provide reliable, long-term service in the severe operating environments associated with offshore oil and gas production and coastal process facilities.

Corrosion at pipe supports
Corrosion at pipe supports is one of the leading causes of process piping failures, which can have potentially catastrophic results. All styles of pipe supports, including beam supports and pipe saddles, create crevices where water is trapped and held in constant contact with the pipe surface. Once corrosion is initiated in these pockets, it can quickly undercut the paint film and cause rapid wall loss as it spreads from the crevice. If these conditions are not addressed, entire sections of pipe can fail and require replacement.

Deepwater developed the I-Rod pipe-support system specifically to combat crevice corrosion and ensure longer, safer lives for pipelines by eliminating crevices between pipes and supports.

Polyshrink
Polyshrink is applied over the shank of the U-Bolt to protect the pipe’s paint system during installation, and is not designed to protect the U-Bolt. The material is a cross-linked, high-compressive-strength, UV-stable polyolefin. It can remain in service in temperatures up to 230 °F (110 °C).

Coatings
The bolt is available in carbon steel with one of two coatings: Hot-dip galvanized or SermaGard®, which is a corrosion-resistant coating reliable in even the harshest offshore conditions. Bolts are also available in 316 stainless steel.

Half-round I-Rod support
Standard I-Rod material works extremely well for most process piping conditions. In situations with extreme operating temperatures, Deepwater can substitute the more resistant I-Rod HT material. Deepwater also offers PEEK material for environments that prove too severe for either, though these instances are rare. For details about all three materials visit stoprust.com.

Maintenance and durability
The Nu-bolt assembly provides an electrically-isolated stand-off between the pipe and the supporting beam or saddle clamp, which allows for easy maintenance and inspection. I-Rod also has excellent compressive strength and a very low friction coefficient. Nu-bolts have been in continuous operation since 1989, when the first new structure specified I-Rod and Nu-Bolt.

More info at www.stoprust.com