EUROPEAN FEDERATION OF CORROSION
Working Party "CATHODIC PROTECTION"
(EFC WP 16)

Minutes of the 10th Meeting
September 14th 2004, Nice, France

Welcome, Apologies

The meeting was opened by M. Roche, who presented the Working Party (objectives, date of creation, annual frequency of meetings) for the persons who were attending the meeting for the first time, and then reminded the topics to be discussed. After the usual apologies for the people who could not attend the meeting and the attendance list for those who could (see appendix 1), the intended agenda (as depicted in the invitation, see appendix 2) started the session. X. Campaignolle (Gaz de France) accepted to be the secretary for this meeting.

Approval of the minutes of the 9th meeting held in Budapest, Hungary, on September 30th, 2003.

The minutes were approved without modification.

Activities and targets of WPl6: 3 years work program for EFC

The EFC WP16 work program has been revised as requested by the STAC.

1- Exchange information and recommendations for CP measurements and coating surveys techniques for buried pipes. A new EFC Publication ("green book") should eventually be proposed. However, there are difficulties to get people involved (see previous meeting's minutes).

2- Certification of personnel / companies in CP (with CEN TC219 WG5). There are also links with CEOCOR (Sector A), but it has not been possible up to now to launch any collaborative work. Within CEOCOR most European gas and water transmission companies are active, but they tend not to attend the EFC which makes it difficult to set-up any collaborative work: they do not see the point.

3- Communication during Eurocorr technical sessions. In addition to general issues on CP and applications on buried structures, there are joint sessions with WP 9 (marine) and WP 11 (concrete). The group meets once a year during the Eurocorr. During certification activities there were more meetings: twice a year.

4- The group is on the EFC website, but further support of the EFC web is sought at this time, as for now the working group contribution is limited to the statement of the objectives. Any suggestion will be welcomed.

- The meeting's minutes could, for instance, be available on the EFC' web.
- There could be a discussion forum for matters such as the Belgian incident. The forum could be similar to Nace's. But is there a need for both an American (international) and European forum?
- Previous activities such as certification should be mentioned.

- The website should be a tribune for its activities: what we want to do, what we actually do. It should be attractive. The objectives should be better stated. More attention should be drawn to the importance of the subject.

5- A contribution to the EFC newsletter would be nice. There will be an article (written by Marcel Roche?) describing the certification work and mentioning the European standards sent to inquiry at this time.

6- Working group on the state of the art report to issue an EFC publication (see further in this report). Although there is a consensual need for such a report, not much has been done so far just a short list of points to focus on that needs to be completed with a list of relevant standards and other documents.

7- The EFC 16 supports EFC workshops such as the Aix-en-Provence meetings (last one in 2002, next one possibly in 2006). There could possibly be one in Morocco.

8- Although the group intends to promote collaborative research and testing programs, there is nothing done or expected at this time regarding this matter. Similarly, there is no participation to any EEC funded project, mainly because the group activity does not fit with the European 6th program. The EFC should lobby the EEC to bring some interest into corrosion protection.

Preparation of the work on EFC Publication on the "State of the Art" report for assessment of CP of buried pipelines.

Brian Wyatt provided the group with a presentation entitled "Advanced systems of overline assessment of coatings and cathodic protection". The presentation was given by John Thirkettle. It is reproduced in appendix 3.

Issues:

1. Discriminate cathodic protection surveys from coating defects
2. Synergetic effect of various techniques: CLPS + DCVG + ILI are a need for confidence levels

A guidance document would be useful to explain the pros and cons of each technique and especially what can be expected from each of them. The existing proposed table of contents is reminded in appendix 4)

There is a 1988 lnstitute of Corrosion/NACE document (State of the Art *"Specialized surveys for buried pipelines".* Corrosion Engineer Association task group E 2-4, document N^0 0288, September 1988) on a very similar subject which needs a serious update. It may be used as a starting point for our new document as it already proposes a frame. It will be sent to the group members, after approval from the Institute of Corrosion. New standards or recommendations such as ECDA will have to be taken into account to update. There is also a UK document on CIPS and DCVG that could be, one way or the other, integrated into the future state of the art (*"Specification for close interval potential surveys & integrated dc voltage gradient surveys",* draft, version 2.1, March 2003)

As there are groups working on similar items both in France (CEFRACOR) and UK, joint meetings could be useful to exchange information.

CEOCOR collaboration would be a good point. Marcel Roche will try once again to facilitate collaborations. However, as the CEOCOR's position until now is that no such document is

needed, there are limited chances of success.

Specific techniques may be used for disbonded coatings: NMR to detect water under the coating, Eddy currents magnetic principle (NoPig), but new ideas from other fields will be needed.

Conclusions

We all agree to do something:

1. The ICorr documents will be sent to those who will agree to participate to the elaboration of the EFC Publication.
2. **Should enough volunteers exist**, there could be a meeting in March/April 2005 to discuss and review those two documents.
3. Marcel Roche will contact others (through EPRG and CEOCOR) to ask them to join the Working Group

Information on the work carried out in the frame of the CEN/TC2I9/WG5 on "Qualification and Certification of cathodic protection personnel"

Cf appendix 5.

M. Roche reminded the background and the present situation as well as the main decisions and actions taken concerning the process of qualification and certification of personnel, services and companies in the field of Cathodic Protection. Briefly, this certification work was initiated in 1998 by the EFC 16. A report on certification was issued in 2001. The CEN TC219 WG5 started end of 2000. The presentation focused first on the current European situation regarding personnel certification (Germany, France, Italy, UK, and Netherlands) and the NACE system; second, on the European standardization to be implemented.

The future standard will be a frame allowing independent national certifications. It should reveal equivalences between countries. There will be 3 levels of competence and 4 application sectors. It will have five years validity. Training will be mandatory but organisation is left to the responsibility of certification bodies. The Committee Draft is to be sent for the 6 months inquiry after January 2005.

A case history on corrosion under extensive 3 layer PE and HSS coating disbondings (Total SA experience)

Cf appendix 6.

Marcel Roche addressed the problematic of disbonding of coatings and corrosion with buried pipelines, cathodically protected. This problem is particularly acute as it may be detected by ILI (pigs), but not surely by surface electrical techniques due to shielding effect. Most of the cases of massive disbondings of 3 layer low density PE did not reveal any corrosion. However, in Gabon, Total experienced major corrosion concerns under both heat shrinkable sleeves on field joints and under plant applied coating. Where corrosion was encountered, the soil could be characterized as corrosive: wet, containing bacteria, electrolyte renewal, CP shielding, low resistivity. However, such corrosions have never been reported in marine application (seawater).

Typical cases of corrosion due to shielding effect of disbonded tapes or bituminous enamels

are well known. More recently, many cases of 3 layer LD PE disbonding have been reported (Syria, Argentina, Gabon,...). The coating always disbonds at the metal-epoxy interface. Most of the time the corrosion remains light as the coating stays compressed to the pipe, providing almost no gap to allow the access of corrosive species. These disbondings were always reported for pipes in service (buried), never on original pipes kept in storage areas. For instance, in Syria, a 16'' oil pipe laid in 1994, displayed coating disbonding without corrosion.

In Gabon, the pipeline system is composed of three sections disconnected at pigtraps. It has a total length of 234 km. The pipe is made of X60, 18" diameter. There was no design corrosion allowance as no internal corrosion was expected (waxy oil, without water). In parallel, the best available external coatings (or thought so) were used. The inlet operating temperature is a stable (60^0C), with a MAOP of 100 bars (nowadays operated at 40 bars). The soil is a wet compacted sand rather acidic (pH 5.4). The CP stations using T/R's are located at the pipes extremities completed by 2 intermediate solar cell powered CP stations. On the first section there has been an overprotection (-6.4 V/SCEon) during two months in 1991 due to a lightning damage on a solar powered station.

The coatings were applied in France and Germany with the presence of inspectors. The epoxy layer was 70 μtm thick. The field joints made of heat shrinkable sleeves with hot melt adhesive were applied over a liquid epoxy primer and fully inspected. The metal surface was brush cleaned prior to application.

The ILI (MFL pig) revealed 13600 features, most of them within the first 13 km of the line (hottest part). 12494 defects were below 20% wall thickness, 1168 between 20 and 40%, 11 above 40%. The maximum (57%) was found under disbonded HSS at a field joint area, at an operating temperature of 55^0C. The use of ASME B31G showed no repair is necessary as the corrosions are of localized nature. ILI results were confirmed by excavations.

Most corrosion was located at field joints with massive disbonding and shielding effect. Plant applied coating appears externally 0K although it disbonded. On the metal surface a black powder was found. Later analysis revealed magnetite, goethite and pyrrhotite. This magnetite could be due to water and oxygen permeation through the coating (they always exist in polymers). Some corrosion was found at random (46 tubes within the first 13 km). On those spots the coating was longitudinally cracked at 3 and 6 o'clock position. No conclusive effect of bending has been found. The PE shows loss of elongation properties as well as an increase of viscosity. Water content, shore hardness, IR spectrometry, all confirmed a thermal aging of the material.

On the other (cold) sections of the pipeline, neither disbonding, nor corrosions were encountered.

Investigations are still in progress: temperature profile, correlation between plant and disbonding, excavations, DCVG & CIPS will be implemented. Further work will be necessary to better understand the phenomenon and to be able to detect it. Both disbonding risk and linked corrosion risks need to be investigated for both existing and future lines. Concerning future lines, an optimisation might be found on the type and/or thickness of epoxy to be used. However, thickness may not be such a relevant parameter as similar disorders have been reported on line in Pakistan with a 200-300 μm thick epoxy layer.

Participation to the next events

Next EFC WPI6 meetings

- **Eurocorr2005, Lisboa, Portugal**

Papers to be submitted: mainly on methods of detection of corrosion & CP efficiency on buried pipelines. There could be a forum at the end of the session.

Other technical topics and free discussions

Possible subject of investigation

Dibondings detection from surface

Discussion on Inspection techniques

CIPS should be used for CP. DCVG should be used for coating defects. ILI for metal loss. They are complementary methods providing different information. One should therefore first find the coating defects, then perform a CIPS to be sure those defects are protected.

There are companies performing ILI on short distances using an optic fiber leash to provide a direct visualization of the results. The company (ITAG) also installs pigtraps.

X. CAMPAIGNOLLE
Secretary EFC WP 16

M. ROCHE
Chairman

6 appendices