

MINUTES OF THE WP4 FALL MEETING
HELD IN STOCKHOLM INTERNATIONAL FAIRS
STOCKHOLM, SWEDEN
WEDNESDAY, SEPTEMBER 7TH, 2011



Written by:

Damien Féron

Diffusion:

Present and apologized participants

Juliet Ippolito (EFC Scientific Secretary and Public Relation Officer)

Ines Honndorf (EFC Website)

EFC WP4 "NUCLEAR CORROSION"

Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
Vice-Chairman	Thierry Couvant	EDF	DMMC - Les Renardières	BP46	F-77818 MORET SUR LOING Cedex
Secretary	Mylène Belgome	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex

Attendance:

Edvige Aublant	Areva NP, France
Eric Cavaletti	Areva NP, France
Bob Cottis	Manchester University, United Kingdom
Andres Del Barrio	Tecnalia, Spain
Damien Féron	CEA, France
Maria del Sol Garcia Redondo	Ciemat, Spain
Hans Hoffmeister	Helmut Schmidt University, Germany
David Anthony Horner	Rolls Royce, UK
Fraser King	Intergrity Corrosion Consulting, Canada
Bruno Kursten	SCK-CEN, Belgium
Andraz Legat	ZAG, Slovenia
Christina Lilja	SKB, Sweden
Jan Macak	Institute of Chemical Technology, Czech Republic
Digby D. Macdonald	Penn State University, USA
Anders Molander	Studsvik, Sweden
Gen Nakayama	IHI Corporation, Japan
Stéphane Perrin	CEA, France
Juha Piippo	Cormet, Finlande
Philippe Prené	CEA, France
Stefan Ritter	PSI, Switzerland
Bo Rosborg	Rosborg Consulting, Sweden
Petr Sajdl	Institute of Chemical Technology, Czech Republic
Kazuya Tsutsumi	MHI Ltd, Japan
Borje Wegemar	Westinghouse AB, Sweden

Apologies for absence received from:

Mylène Belgome	CEA, France
Miroslava Ernestova	Nuclear Research Institute Rez, Czech Republic
Catherine Guerre	CEA, France
Valérie L'Hostis	CEA, France
Virginia Madina Arrese	Tecnalia, Spain

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Enclosures:

* Document available only on the private space of the EFC WP4 website, for WP4 Members

- ✓ Annex 1 Agenda of the Stockholm meeting
- ✓ Annex 2 Slides presented by D. Féron at the Stockholm meeting*
- ✓ Annex 3 Proposed rules for Poster Prize, Oral Prize and Honorary Medal of the WP4*
- ✓ Annex 4 Presentation made by Bruno Kursten*
- ✓ Annex 5 Presentation made by Stephan Ritter*
- ✓ Annex 6 Presentation made by Thierry Couvant*
- ✓ Annex 7 Slides related to the LongTermCor2013 (Japan)*

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1. OPENING AND APPROVAL OF THE AGENDA

D. Féron opened the fall meeting and thanked the audience for coming. Agenda was presented and approved, as no comments were made.

2. APPROVAL OF THE MINUTES OF THE MOSCOW AND AVIGNON MEETINGS

These minutes are approved without comments.

3. EFC INTERNAL MATTERS

After a short presentation of the WP4 (history, objectives, rules), D. Féron presented the objectives of the next 3-year plan and proposed to move the dates of the plan to 2012-2014 (instead of 2011-2013):

- ✓ providing links between European teams and EU funded programs in nuclear corrosion field, with an opening on to the world;
- ✓ initiating and stimulating opportunities of exchanges on scientific & technical subjects related to nuclear corrosion, particularly on today main nuclear research areas: waste systems, water reactors, generation IV and fusion reactors;
- ✓ promoting corrosion science and technical developments by events such as seminars, workshops, publications, etc.

The following actions, already approved during the previous full meeting, are described again with emphasis on bold items:

- ✓ Two WP meetings each year
 - * Spring meeting (more focus on one or few items)
 - * Annual general meeting during EUROCORRs
- ✓ Specific seminars/workshops
 - * During EUROCORRs
 - * In connection with EU programs
 - * On specific subjects
- ✓ Re-activation of the task forces (groups)
- ✓ Webpage: active and attractive
- ✓ Publications: in EFC series (one book per year) and Journals (two publications each year)
- ✓ Development of links between EFC WP4 and nuclear organisations (Euratom, OECD/NEA, UN/AIEA)
- ✓ Summer School "nuclear corrosion"

Some other specific actions were:

- ✓ To reinforced the links with European programs:
 - * Proposal of a workshop on nuclear corrosion with PhDs and post-docs working in the area. This proposal is quite well accepted.
 - * Common events with PERFORM60, PERFECT, ect. (try to exclude meetings at the same date)

EFC WP4 "NUCLEAR CORROSION"

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- ✓ To enhance the EUROCORR event and WP4 visibility
 - * We may systematically propose to publish EUROCORR's papers in JNM or an EFC journal. This could be done already this year particularly for the Workshop "Corrosion monitoring in nuclear systems" which is held during this EUROCORR'2011 (Annex 4).
 - * D. Féron proposed also to create two Prizes: one for "poster" and one for "oral" communications (eligible only if the paper is in the proceedings). Another "Honorary medal" of the Nuclear Corrosion Working Party may also be created. It is stated that the Oral Prize has to encourage young researchers. The proposed rules for the Poster Prize, the Oral Prize and the Honorary Medal are proposed (Annex 3). It is decided that these rules will be approved at the next WP4 meeting, if possible during the Spring meeting).
 - * Bo Rosborg proposed to create exchanges with young nuclear engineers and researchers from Europe and Asia. A few young researchers from a few Asian countries (or from a single country), apply for participation in a group visit to European nuclear facilities and research organizations, and vice versa for a few young researchers from European countries who may apply for participation in a group visit to Asian nuclear facilities and research organizations. He will try to start contacts in that way by the beginning of 2012.

4. EFC WP4 PUBLICATIONS

One EFC "green book" has been published since the last WP4 Fall meeting: EFC #59 ("Sulphur Assisted Corrosion in nuclear disposal systems", editors: B. Kursten, F. Druyts & D. Féron, published in August 2011, 192 pages, ISBN: 978 1 907975 17 2) and a special issue of Corrosion Engineering Science and Technology (Vol. 46, N°2, April 2011) which includes the proceedings of the 4th International Workshop on Long Term Prediction of Corrosion Damage in Nuclear Waste Systems (Guest editors: B. Kursten and F. Druyts, SCK-CEN, Belgium).

The proceedings of the "Ageing Management of Nuclear Structures and Installations", AMP 2010 Workshop held in November 2010, have been published in "The European Physical Journal" (Vol. 12, 2011).

One book is under preparation: a "green book" entitled "50 years of stress corrosion cracking of nickel based alloys", from the presentations made during the "Jubilee day" on January 26th, 2010.

5. EFC WP4 EVENTS

The year 2010 has been particularly rich in WP4 events as 4 have been already held:

- ✓ Jubilee day: Stress Corrosion Cracking of nickel base alloys at CEA - Coriou effect/50 ans de corrosion sous contrainte au CEA - Effet Coriou
26 January 2010 at the CEA/Saclay - 130 participants
- ✓ International workshop on "Coupling mechanisms to improve lifetime prediction of LWRs"
EFC Event 331, 08-09 April 2010, Les Renardières (France), EDF-MAI (Material Ageing Institute) - 50 participants
- ✓ 4th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems"
EFC Event 329, 28 June - 2 July 2010, Bruges, Belgium, SCK-CEN - 65 participants (Annex 4)
- ✓ International workshop "Ageing Management of Nuclear Structures and Installations"
EFC event 334 (with AECL and RILEM), 08-13 November 2010, Toronto, Canada - 96 participants

EFC WP4 "NUCLEAR CORROSION"

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Several events are planned for 2012 and 2013

- ✓ An International workshop "Stress corrosion cracking of weld metals in LWRs" EDF-MAI (France) is in preparation for September 2012 by Th. Couvant (Annex 6). This workshop may be in conflict with the previous one planned with PhDs and post-docs. No decision is taken.
- ✓ NUCPERF 2012, Long-Term Performance of Cementitious Barriers and Reinforced Concrete in Nuclear Power Plant and Radioactive Waste Storage and Disposal, 12-15 November 2012, in Cadarache (France), EFC event 351.
- ✓ 5th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems (LongTermCor2013)", 07-11 October 2013, in Asahikawa, Hokkaido, Japan, organised by Dr. Eng. A. Hidekazu (Application for an EFC event number - Annex 7).
- ✓ The Summer School on Nuclear Corrosion is discussed again. It appears that several events are already planned in 2012 and it seems difficult to add one more event; A. Legat will check what is possible to do.

6. EFC WP4 WEBSITE

The WP 4 website is described and shown (Annex 5). 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](mailto:S.Ritter).

The address is: http://www.efcweb.org/Working_Parties-p104085/WP_4.html.

A restricted area (for members only) has been added to the WP 4 website. The password will be provided only to members.

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

7. EUROCORR_s

- ✓ EUROCORR'2012, 09-13 September, Istanbul (Turkey) where a Nuclear Corrosion session is planned and a workshop on Environmental sensitive fracture with the WPs 3 and 9
- ✓ EUROCORR'2013, 01-04 September, Lisbon (Portugal)
- ✓ EUROCORR'2014, 08-12 September, Pisa (Italy)

8. MISSING ITEMS, CONCLUSION AND CLOSURE

The next Fall Meeting of the EFC WP4 will be held in Istanbul (Turkey) during EUROCORR'2012.

It is planned to have a Spring Meeting (location to be defined).

The meeting is closed as no other point is raised.

EFC WP4 "NUCLEAR CORROSION"

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**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

Enclosure 1:

- ✓ Annex 1 Agenda of the Stockholm meeting

EFC WP4 "NUCLEAR CORROSION"

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Fall meeting of the Nuclear Corrosion Working Party (EFC WP4)

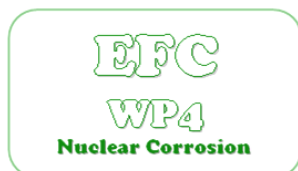
Wednesday, 7 September 2011 (16h10-18h)

Stockholm International Fairs, Room 6
Stockholm, Sweden

(Information are given on the Eurocorr website <http://www.eurocorr.org/EUROCORN+2011.html>)

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 Moscow and Avignon 2011 fall meetings
3. EFC WP4 internal matters
 - Short presentation of the EFC WP4
 - The new 3 years plan
4. EFC WP4 Publications
 - Books & special issues already published
 - Future publications
5. EFC WP4 past events
6. EFC WP4 future events
7. EFC WP4 website
8. EUROCORR's
9. Missing items
10. Closure



**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

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 Stockholm meeting

EFC WP4 "NUCLEAR CORROSION"

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Welcome

to the

EFC WP4 "Nuclear Corrosion" Fall Meeting

Damien Féron, Chairman of the WP4
Thierry Couvant, Vice-Chairman of the WP4

Mylène Belgome, secretariat

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron

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Apologies for absence received from:

- * Mylène Belgome (CEA, France)
- * Miroslava Ernestova (Nuclear Research Institute Rez, Czech Republic)
- * Virginia Madina Arrese (TECNALIA, Spain)
- * Valérie L'Hostis (CEA, France)
- * Catherine Guerre (CEA, France)



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

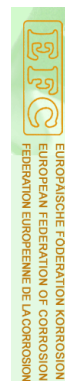
D. Féron

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1. Opening and approval of the agenda



1. Opening and Approval of the agenda
2. Approval of the minutes of the 2010 fall meetings
3. EFC WP4 internal matters
 - Short presentation of the EFC WP4
 - The new 3 years plan
4. EFC WP4 Publications
 - Books & special issues already published
 - Futures publications
5. EFC WP4 past events
6. EFC WP4 future events
 - Workshops and seminars
 - Summer school
7. EFC WP4 Website
8. EUROCORR's
9. Missing items
10. Closure



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2. Approval of the minutes of the Nice Meeting



[Minutes of the WP4 fall meetings \(2010\)](#)

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 4

3. Internal matters: Short presentation of the EFC WP4



Objectives of the WP4 "nuclear corrosion"

- To provide links between European teams in nuclear corrosion field, with an opening on to the world
- To initiate and stimulate opportunities of exchanges on scientific & technical subjects related to nuclear corrosion, particularly on today 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, ...



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron

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3. Internal matters: Short presentation of the EFC WP4



Timeline of the WP4 "nuclear corrosion"



EFC (1955)	1950	
Preliminary Period (55-67)	1960	Prof. M. BEHRENS - Dechema, Germany, asked for the WP "nuclear corrosion"
WP4 (1967)	1970	H. CORIOU, Chairman 12 countries : Austria, Belgium, Denmark, France, Germany (Federal R.), Hungary, Italy, Nederland, United Kingdom, Spain, Sweden, Switzerland and Euratom 34 members
First Period (67-85)	1980	
1986: WP4 organization	1990	P. BERGE (86-94) 13 countries 140 members (1992) F. DE KEROUHAS (94-99)
Second Period (86-00)	2000	J. DARET, (00-02)
Transition (00-02)		
Third Period (02-)		D. FERON, (02-) 14 countries 120 members

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D. Féron

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3. Internal matters: Short presentation of the EFC WP4

Organisation of the WP4 "nuclear corrosion"



- A Chairman (Damien Féron, CEA - France)
- A vice-Chairman (Thierry Couvant, EDF - France)
- Members : *"In addition to delegates proposed by the Member Societies, the Chairman may propose and approve with the consent of the WP, the nomination and re-election of WP members;*

NOTE: Each period of office for WP members is of three years. At the end of each such period, re-election for further periods of three years may be allowed at the discretion of the WP chairman."

- 120 members, 10-20 active members
- Two meetings: "Eurocorr meeting" & "Spring meeting"
- Task forces
- Publications

- webpage: <http://www.efcweb.org/Working+Parties/WP+4.html> -

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D. Féron

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3. Internal matters: Short presentation of the EFC WP4



• Recall: Duties of members (§4.4)

1. Members are expected to attend meetings of the WP on notification from the Chairman or Secretary;
2. Members should participate in the technical and scientific activities of the WP by providing reports and, wherever possible, by participating in collaborative experimental work;
3. Members are required to give full support, notably by submission of high quality papers, to the annual EUROCORR conference of the EFC.



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

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3. Internal matters: Short presentation of the EFC WP4



EFC WP4 publications

In EFC series (green books)

Other books & issues published by EFC WP4



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron

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3. Internal matters: proposal of the next 3 years plan 2012-2014



Objectives of the "next" 3-year plan (2012-14)

- 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 & technical subjects related to nuclear corrosion, particularly on today 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, ...

- Same objectives than the previous plan (08-10)

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron

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3. Internal matters: proposal of the next 3 years plan 2012-2014



Actions of the next 3-year plan (2012-14)

- Two WP meetings each year
 - Spring meeting (more focus on one or few items)
 - Annual general meeting during Eurocorr
- Specific seminars /workshops
 - During Eurocorr
 - **In connection with EU programs**
 - On specific subjects
- **Re-activation** of the task forces (groups)
- Webpage: active and attractive
- Publications: In EFC series and Journals (one per year)
- Development of links between EFC WP4 and nuclear organisations (**Euratom**, OECD/NEA, UN/AIEA)
- **Summer School "nuclear corrosion"**

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 11

3. Internal matters: proposal of the next 3 years plan 2012-2014



EFC WP4 tasks forces

Active groups

1. *Management (chairman, vice-chairman, secretary)*
2. *Corrosion and extension of life time of existing power plants*
3. *Prediction of long term corrosion in nuclear waste repositories*
4. *Concrete behaviour in NPP and waste facilities*
5. *Electrochemistry at high temperature*
6. *Corrosion monitoring (ECG-COMON)*
7. *Corrosion of Internals in LWR (merge with 2 - Corrosion in LWRs?)*
8. *Generation IV*
9. *Corrosion issues in fusion facilities*
10. *Education - Summer School(s)*



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3. Internal matters: proposal of the next 3 years plan 2012-2014



Some proposals to "reinforced" actions of the 3 year plan (1/2)

1. *"Reactivate" the Spring meeting*
2. *"Summer school" on nuclear corrosion*
3. *Links with EU programs*
 31. *Proposal a workshop of PhDs and post-docs on nuclear corrosion (Th. Couvant)*
 32. *Common events with PERFORM60, PERFECT.... (try to exclude meetings at the same date)*
4. *Publications: Two per year in EFC series and Journals*
5. *How to activate "non active" Task forces*
 51. *Contact leaders in the area*
 52. *Other s?*

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 13

3. Internal matters: proposal of the next 3 years plan 2012-2014



Some proposals to "reinforced" actions of the 3 year plan (2/2)



6. *Enhance the Eurocorr event and WP4 visibility*
 61. *We have quite a lot of communications (poster or oral), but many papers are missing in Eurocorr proceedings*
 611. *Some papers are proposed to be published in JNN or an EFC journals*
 612. *Prizes : one for "poster" and one for "oral" communications (eligible only if the paper is in the proceedings)*
 62. *"Honorary medal" of the nuclear corrosion working party*
7. *Other ideas*

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4. EFC WP4 Publications

New EFC Series (Green Book)



EFC #56: "Corrosion monitoring in nuclear systems: research and applications" (Editors: Stefan Ritter & Anders Molander) 255 pages - Published June 2010

EFC #59: "Sulphur Assisted Corrosion in nuclear disposal systems" (Editors: Bruno Kursten & Frank Druyst) : Published August 2011, 192 pages,
ISBN: 978 1 907975 17 2



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Corrosion Engineering, Science and Technology

Theme issue: Long term prediction of corrosion damage in nuclear waste systems



AVAILABLE AT THE MANEY BOOTH DURING EUROCORR 2011

Proceedings of the 4th International Workshop on Long Term Prediction of Corrosion Damage in Nuclear Waste Systems, Belgium, June 2010.

Guest Editors: **Dr B. Kursten** and **Dr F. Druyst** (SCK-CEN, Belgium).
Chairman of EFC Nuclear corrosion WP: **Professor D. Féron** (CEA, France)

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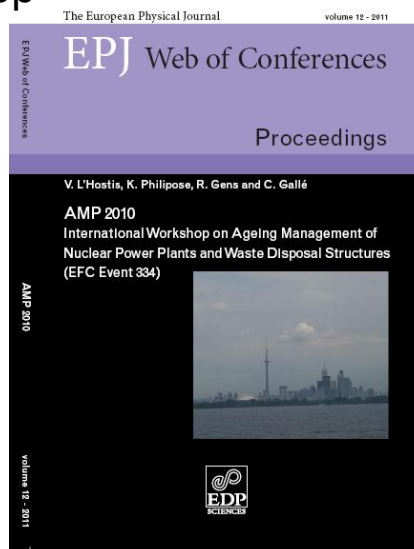


AMP 2010 Workshop

Proceedings of the Workshop (selected papers) have been published in a special issue of the EPJ Web of Conferences – Proceedings

(V. L'Hostis, K. Philipose, R. Gens and C. Gallé, AMP 2010, International Workshop on Ageing Management of Nuclear Power Plants and Waste Disposal Structures (EFC Event 334), The European Physical Journal volume 12 – 2011)

Free copies available by WP4 members on request



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4. EFC WP4 future Publications



• Other publications (EFC series) in preparation

- Green book "Corrosion issues in future high temperature nuclear systems" (Eurocorr 2009 Workshop - WP4 & WP3) **Cancelled**
- Green book "50 years of stress corrosion cracking of nickel based alloys" (from the presentations made at the "Jubilee day - January 26, 2010)
- Others green books (?)



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

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4. Publication of workshop papers



- **International workshop on "Coupling mechanisms to improve lifetime prediction of LWRs"**, - EDF-MAI **Cancelled ?**
- NUCPERF 2012 (24-27 September 2012, Cadarache, 2012) - proceedings (planned in 2013)
- **Other publications (?)**
 - "Corrosion issues in nuclear industry today", Springer Publishing, (Thierry Couvant - Stefan Ritter & Bruno Kursten.) « Degradation, modelling and mitigation of SCC in LWRs »
 - Proceedings of the 5th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems" (2013), special issue of *Corrosion Engineering, Science and Technology* (2014)

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

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5. EFC WP4 past events (2010/11)



- **Jubilee day: Stress Corrosion Cracking of nickel base alloys at CEA - 50 ans de corrosion sous contrainte au CEA - Effet Coriou effect**- January 26, 2010 at CEA-Saclay
130 participants -
Free copies available by WP4 members on request
- **International workshop on "Coupling mechanisms to improve lifetime prediction of LWRs"**, EFC event 331, 8-9 April 2010, Les Renardières (France), EDF (Material Ageing Institute)
50 participants
- **4th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems"**, EFC event 329, Bruges, Belgium, SCK-CEN, 28 June - 2 July 2010
65 participants
- **International workshop "Ageing Management of Nuclear Structures and Installations" AMP 2010 Workshop** Toronto, Canada, November 8-13, 2010 - EFC event 334 - with NEA/AEN and RILEM



PhotoCor2010.2 - Group photo of the attendees of the LongTermCor2010 Workshop

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Organised By



Call for Papers

AMP 2010
International Workshop on
Ageing Management of Nuclear
Power Plants and
Waste Disposal Structures
EFC Event 334

2010 November 7 to 10
1700 - 480 University Avenue,
Toronto, Ontario, Canada

AMP 2010 Workshop
Toronto, November 2010

Co-Sponsored by



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

Attendance

96 participants from 13 different nationalities (Canada, U.S., France, Spain, Belgium, U.K., Slovenia, Argentina, Korea, Romania, Finland, Denmark, Sweden)



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

Sessions and papers

5 sessions, 34 oral papers.

- » Opening session (national programmes),
- » Aging Management Programmes,
- » Materials testing,
- » Non Destructive Techniques,
- » Evaluation of Long-Term Performance.

Panel discussion

Need for international input data based from dismantling operation (from non destructive evaluation, materials characterizations, etc.)



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

6. EFC WP4 future events

- **2nd Int. Workshop on `Corrosion Monitoring in Nuclear Systems (Research and Applications)`** Special WS during EUROCORR 2011, 5 - 8 September 2011, Stockholm, Sweden
Organised by Stefan Ritter and Anders Molander in collaboration with the ECG-COMON
- *Proposal a workshop of PhDs and post-docs on nuclear corrosion (Th. Couvant) - 2012*
- **International workshop "Stress corrosion cracking of weld metals in LWRs"** EDF-Mai France, 2012 - in preparation
- **Next annual ECG-COMON meeting, June 18 & 19, 2012 Netherlands**
- **NUCPERF 2012, Long-Term Performance of Cementitious Barriers and Reinforced Concrete in Nuclear Power Plant and Radioactive Waste Storage and Disposal / 24 - 27 September 2012 / Cadarache - France** (Application for an EFC event number)
- **5th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems (LongTermCor2013)"**, 2013-Japan

Summer School on "Nuclear Corrosion"




NUCPERF 2012

**Long-Term Performance of Cementitious Barriers
and Reinforced Concrete in Nuclear Power Plant
and Radioactive Waste Storage and Disposal**

24 - 27 September 2012

Cadarache - France

NUCPERF 2012 Presentation

1

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 1

Expected topics

a) Performance and safety assessment

Physical and chemical behaviour of cementitious system
Data treatment and model parameters
Uncertainty management
Use of analogues

b) Aging Management of Nuclear Power Plant

Monitoring and assessment
Sensors and NDE methods
Impact of aging and chemical degradation on safety margins
Modelling remaining service life of NNP structures

c) Test approaches

Accelerated tests
Parameters measurements
Upscaling and field application of laboratory tests

d) Physical, chemical and mechanical behaviour

Experimental characterization
Coupled modelling approaches
Thermal and radiolytic effects
Transport in unsaturated systems
Carbonation
Impact of cracking

e) Metallic corrosion

Anaerobic corrosion
Thermal and radiolytic effects
Environmental effects
Stability of passive layers
Consequences of corrosion on concrete performance
Corrosion in blended cements and new binders
Modelling

- Panel discussion (1/2 hour) after each session and at the end of the workshop a half-day session of restitution and general discussion about how to incorporate this knowledge in order to improve the performance and design of new facilities could be organized

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 1

Proposed key dates

October 2011	Announcement, call for papers Web site opening: www.NUCPERF2012.fr
30 March 2012	Deadline for abstracts submittal
May 2012	Abstracts reviewing
1st June 2012	Notification to the authors, Workshop registration and accommodation
7 September 2012	Deadline for registration Deadline for full paper submission
24 – 27 September 2012	Workshop – Booklet of abstract distributed
After the event	Publication of proceedings

Registration, accommodation and venue

Registration and Accommodation

The registration form available on the website should be completed and sent not later than 7 September 2012 to the conference office. The registration will be confirmed by the organising committee.

- Fees will be asked to cover meals, coffee breaks and all practical arrangements during the workshop.
- Each participant will cover its own travel and accommodation expenses.
- Room reservations will be made through the conference office (nucperf2012@cea.fr).

Venue

The workshop will be held at the "Château de Cadarache". This old castle from the 13th century is located in the south of France at 40 km from Aix-en-Provence and 70 km from Marseille. It is the "Maison d'hôtes" of the CEA Cadarache Centre.



6. EFC WP4 future events



5th International Workshop on "Prediction of Long Term Corrosion Behaviour in Nuclear Waste Systems (LongTermCor2013)"



- Discussions with Dr.Eng. ASANO Hidekazu, Radioactive Waste Management Funding and Research Center Pacific Marks, Tsukishima, Japan
- Agreement of Lyon Stuart to publish the proceedings in a special issue of *Corrosion Engineering, Science and Technology*.
- Support from CRIEPI (Central Research Institute of Electric Power Industry)
- Scheduled in October 2013, in Hokkaido
- The first circular of the workshop will be sent in around next May, 2012.

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 29

6. EFC WP4 future events



Summer School "nuclear corrosion"



- Proposed in Maastricht (2006)
- WP4 Spring Meeting 2008 decisions
 - Target: young scientists and engineers
 - Topics: 3-days general session + 2-days focus on specific item (NPP, Gen IV, Nuclear Waste, ...)
 - The event will be organised in relation with others (ENEN / European Nuclear Education Network)
 - Task Force "Summer School": B. Kursten (Chair), B. Cottis, D. Féron, A. Legat, St. Ritter, D. Tice, P. Wood, M. Le Calvar
 - It is planned to have one event every (x) years
- Planned initially in Belgium, SCK-CEN resigns (Spring meeting 2009)
- Andraz Legat (Slovenia) offered to organise the 2nd summer school -> the first edition (?)

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

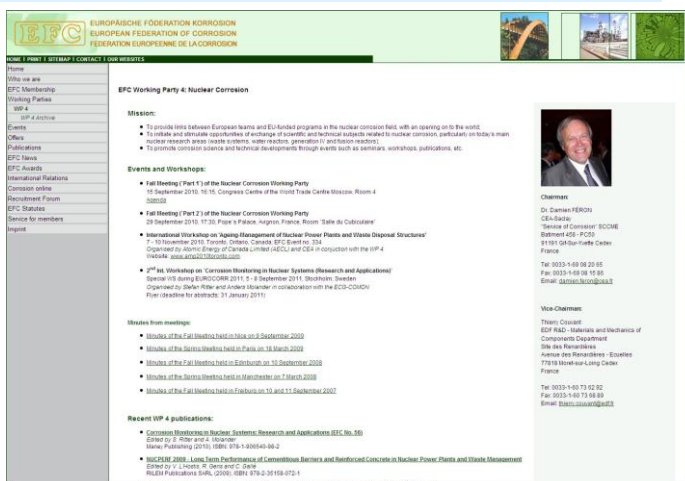
D. Féron 30



- Items on the web site:
 - ✓ **WP4 activities:** reports on WP4 activities and presentation of the WP4 at OCDE/NEA
 - ✓ **WP4 groups:** ECG-COMON
 - ✓ **Minutes of the WP4 meetings** (without overheads)
 - ✓ **Future events/workshops of the WP4**
 - ✓ **WP4 recent publications**
 - EFC series
 - Other publications
- **EFC website has been "renewed"**
New presentation - easier to use
- **Stefan Ritter** in charge of the WP4 web page: many thanks for the work done
- New : a "private domain"

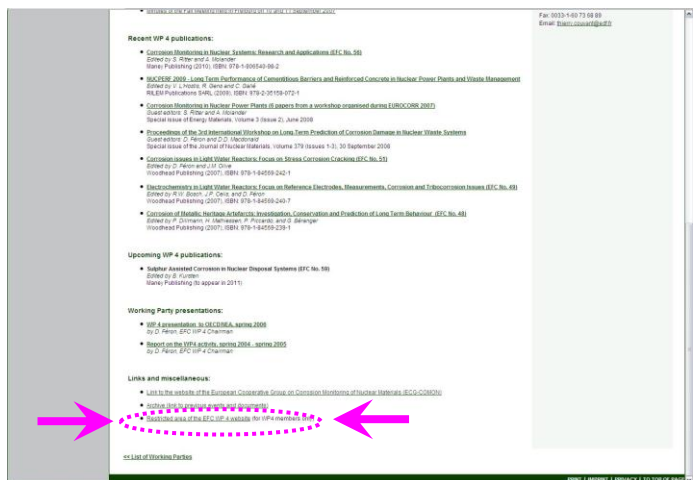


The WP 4 website is updated frequently!
Please pass by from time to time and/or
**feel free to send events or any other
useful infos to**
stefan.ritter@psi.ch



Status of EFC WP 4 website (www.efcweb.org)

A restricted area (for members only) has been added to the WP 4 website. The password will be provided on request



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 33

8. Eurocorr

- **EUROCORR 2011** 5-8 September, Stockholm, Sweden
- **Workshop** "corrosion monitoring in nuclear systems" (S. Ritter - ECG-COMON) : 10 papers / one day workshop
- **Nuclear corrosion session**: 39 papers (26 orals and 13 posters)
- **EUROCORR 2012 "Safer World through better Corrosion Control"** 9-13 September, Istanbul, Turkey
Common workshop with several WPs, including WP5 (Environmental sensitive fracture) on Stress Corrosion Cracking (Flyer under discussion with C. Wolski)
- **EUROCORR 2013 "Corrosion control for a blue sky"**
1-5 September, Estoril, Portugal
- **EUROCORR 2014 "Improving Materials Durability: from cultural Heritage to industrial Applications"**
8-12 September, Pisa, Italy

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 34



EUROPAISCHE FÖDERATION KORROSION
EUROPEAN FEDERATION OF CORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION



Workshop on occurrence and mechanisms of Environmentally Assisted Cracking

First announcement



A common workshop during Eurocorr'2012, Istanbul, Turkey, 9-13/09/2012

co-organized by :

- WP 4 "Nuclear Corrosion"
- WP 5 "Environmentally sensitive fracture"
- WP 9 "Marine Corrosion"
- WP 13 "Corrosion in Oil & Gas"
- WP 15 "Corrosion in the Refining Industry"
- WP 17 "Automotive corrosion"

This common workshop is intended to be based on two types of contributions: first, overviews of environmentally assisted cracking (EAC) phenomena in relation with specific application fields and second, presentations dealing with mechanisms and modeling of EAC, while contributions specific to application fields will be included in regular WP sessions.

Abstracts should be submitted to EUROCORR'2012 by mid-January 2012. Expressions of interest, either for a common workshop or for a regular session are welcomed. In addition to Eurocorr'2012 proceedings, selected papers will be published by Money, after reviewing process, as an EFC "green book".

For more information (WP objectives, Deadlines, venue and fees) please go to <http://www.eurocorr.org/EUROCORR+2012> or directly contact one the WP chairmen.

WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 1

9. Missing items



Some points to discuss?

...

Date and place of the next EFC WP4 Spring meeting



WP4 Meeting - September 7, 2011 - Stockholm, Sweden

D. Féron 36

10. Closure



**Thank you
for your participation
to the fall
EFC WP4 "Nuclear Corrosion" Meeting
Stockholm, 2011**



**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

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

EFC WP4 "NUCLEAR CORROSION"

Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
Vice-Chairman	Thierry Couvant	EDF	DMMC - Les Renardières	BP46	F-77818 MORET SUR LOING Cedex
Secretary	Mylène Belgome	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex

PROPOSED RULES FOR the POSTER PRIZE of the WORKING PARTY on NUCLEAR CORROSION of the EFC (EFC WP4)

AWARD

The Working Party on Nuclear Corrosion of the European Federation of Corrosion (EFC WP4) establishes a new award for the best Poster presented in the Nuclear Corrosion session and in the workshops supported by the EFC WP4 at each EUROCORR Conference. The aim of the new award is to encourage the submission of more posters of high quality and the submission of the associated paper in the EUROCORR proceedings by corrosion scientists and engineers, including PhD students, post-doctoral researchers, etc.

The Prize, consisting of a certificate (*and the sum of XX€, if we have sponsors???*) will be awarded each year to the scientist or engineer who, in the opinion of the Jury, has made the most worthy presentation during the poster sessions at EUROCORR.

SELECTION OF THE AWARD WINNER

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 eligible authors should have the full paper of their presentation included in the EUROCORR proceedings and should be present by their posters during the relevant poster session.

The criteria to be used in selecting the winner will include:

- 1) The scientific/technical contribution to the field of corrosion covered by the work presented in the paper and in the poster;
- 2) The clarity with which important concepts are conveyed visually by the poster;
- 3) The quality of the verbal presentation by the author during the poster session.

PRESENTATION OF THE AWARD

The presentation of the Award will take place at the start of the EFC WP4 Session or supported workshop on the morning following the final poster session.

FORMER RECIPIENTS OF THE EFC WP4 POSTER PRIZE

The first winner will be selected during EUROCORR 2012 in Istanbul.

**PROPOSED RULES for the ORAL PRIZE
of the WORKING PARTY on NUCLEAR CORROSION of the EFC (EFC WP4)**

AWARD

The Working Party on Nuclear Corrosion of the European Federation of Corrosion (EFC WP4) establishes a new award for the best oral communication presented in the Nuclear Corrosion session and in the workshops supported by the EFC WP4 at each EUROCORR Conference. The aim of the new award is to encourage the submission of more communications of high quality and the submission of the associated paper in the EUROCORR proceedings by corrosion scientists and engineers, including PhD students, post-doctoral researchers, etc.

The Prize, consisting of a certificate (*and the sum of XX€, if we have sponsors???*) will be awarded each year to the scientist or the engineer who, in the opinion of the Jury, has made the most worthy presentation on nuclear corrosion during the Nuclear Corrosion session(s) or the workshop(s) supported by the EFC WP4 at EUROCORR.

SELECTION OF THE AWARD WINNER

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 eligible authors should have the full paper of their presentation included in the EUROCORR proceedings and should present themselves the oral communication.

The criteria to be used in selecting the winner will include:

- 1) The scientific/technical contribution to the field of corrosion covered by the work presented in the paper and in the oral presentation;
- 2) The clarity with which important concepts are conveyed orally during the presentation;
- 3) The quality of the verbal presentation and of the answers to the questions by the presenter.

PRESENTATION OF THE AWARD

The presentation of the Award will take place at the end of the Nuclear Corrosion session(s) or workshop(s) supported by the EFC WP4.

FORMER RECIPIENTS OF THE EFC WP4 ORAL PRIZE

The first winner will be selected during EUROCORR 2012 in Istanbul.

**RULES FOR THE HONORARY MEDAL (AWARD)
of THE WORKING PARTY ON NUCLEAR CORROSION
of THE EUROPEAN FEDERATION OF CORROSION**

(Founded and presented by the Working Party on Nuclear Corrosion of the European Federation of Corrosion)

AWARD

1. The purpose of the Honorary Medal (Award) of the Working Party on Nuclear Corrosion of the European Federation of Corrosion (EFC WP4) is to recognise achievements by a scientist, an engineer, or group of scientists or engineers, in the application of corrosion science in the nuclear field. The recipient(s) must be of a nationality(ies) corresponding to one, or more, of the Member Societies of the EFC *and the work must be conducted within a European country (?)*.
2. The award consists of a medal (*if possible – sponsors / award*) and a diploma.
3. The Medal is sponsored by EFC WP4. The medal has been donated by *sponsor(s) name(s)*. The diploma is donated by the chairman of the EFC WP4. The sum of XX€ will be provided from *sponsors names*.
4. The Honorary Medal of the Working Party on Nuclear Corrosion of the European Corrosion shall be awarded in principle every year preferably on the occasion of the EFC WP4 meeting or session during the EUROCORN.
6. On the occasion of the award ceremony the recipient of the Honorary Medal of the Working Party on Nuclear Corrosion of the EFC will give a lecture related to the work for which the medal was attributed.

DESIGNATION OF AWARD RECIPIENT

7. Serving members of the EFC Board of Administrators, the Chairman of the Science and Technology Advisory Committee (STAC), the Chairman, the Vice-Chairman and the Secretary of the Working Party on Nuclear Corrosion of the EFC are not eligible to be awarded the Honorary Medal of the Working Party on Nuclear Corrosion of the European Corrosion.
8. 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. The Jury members stay in office until a recipient has been designated and has accepted the award.
9. The Jury meets in person, normally at the occasion of an EFC WP4 meeting preceding the date of the award ceremony by at least 3 months.
10. The decision of the Jury is by majority vote of the members present. The decision of the Jury is final. The STAC is informed of its choice.
11. Any member of EFC WP4 shall make proposals to the Jury for recipients of the award. The WP4 Chairman or Secretary should ask EFC WP4 members for proposals. These Proposals have to be addressed to the EFC WP4 Chairman. Proposals must be received at least one month prior to the Jury meeting. They are forwarded to the Jury members at least one month ahead of the meeting of the Jury. In its selection of the award winner the Jury is restricted to the proposals received.
12. If no suitable proposals have been received, the Jury may decide not to attribute the medal in a given year.



**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

Enclosure 4:

Document available only on the private space of the EFC WP4 website, for WP4 Members

- ✓ Annex 4 Presentation made by Bruno Kursten

EFC WP4 "NUCLEAR CORROSION"

Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
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Secretary	Mylène Belgome	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex

EFC WP4 'Nuclear Corrosion' Fall Meeting

Bruno Kursten

SCK•CEN

bkursten@sckcen.be

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SCK•CEN

EUROCORR2011
Stockholm/Sweden, 07.09.2011

SACNUC2008 proceedings (1/1)

- published in August 2011
- European Federation of Corrosion Series No. 59
 - Title: *'Sulphur-Assisted Corrosion in Nuclear Disposal Systems'*
 - Editors: F. Druyts, B. Kursten & D. Féron
 - 192 pages
 - ISBN: 978 1 907975 17 2
 - Proceedings of the Int. Workshop on Sulphur-Assisted Corrosion in Nuclear Waste Disposal Systems (SACNUC2008), 21-23 October 2008, Brussels, Belgium
 - 15 oral presentations (2½ days) + panel discussion session (½ day)
 - 4 withdrawn (no submission of paper)
 - 2 rejected by reviewers + editors (low quality)
- 5 chapters
 - Chapter 1: disposal concepts of nuclear waste and the role of corrosion (1 paper)
 - Chapter 2: sulphur-induced corrosion processes from within and outside the nuclear disposal field (6 papers)
 - Chapter 3: role of microbial processes in sulphur-assisted corrosion (1 paper)
 - Chapter 4: modelling of corrosion (1 paper)
 - Chapter 5: panel discussion (1 paper)

- 4th Int. Workshop on Long-Term Prediction of Corrosion Damage in Nuclear Waste Systems
 - EFC WP4 (EFC Event N° 329) + RILEM Technical Committee TC 226-CNM
 - June 28 – July 2, 2010
 - Conference Centre 'Oud Sint-Jan', Bruges, Belgium
 - Five sessions
 - Overview of the national programmes
 - Experimentation
 - Corrosion behaviour of steel reinforcements in concrete
 - Archaeological artefacts
 - Modelling
 - 42 oral presentations (3 withdrawn) (3 days)
 - 62 participants – 14 countries (Belgium, France, UK, Spain, Slovenia, Sweden, Finland, Switzerland, USA, Argentina, Canada, Japan, Republic of Korea, India)
 - 25 papers submitted
 - 17 withdrawn (no submission of paper)
 - 0 rejected

- Proceedings
 - published in April 2011
 - special issue of 'Corrosion Engineering, Science and Technology' (vol. 46, no. 2)
 - 227 pages
 - free on-line access to the special issue
 - (1) go to website of IngentaConnect: <http://www.ingentaconnect.com>
sign-in using the following details
Username: cstnuclear2011
Password: delegateaccess
 - (2) click the following link to view the issue
<http://www.ingentaconnect.com/content/maney/cest/2011/00000046/00000002>
 - hardcopy of the special issue



**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

Enclosure 5:

Document available only on the private space of the EFC WP4 website, for WP4 Members

- ✓ Annex 5 Presentation made by Stephan Ritter

EFC WP4 "NUCLEAR CORROSION"

Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
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EFC WP 4 website, ECG-COMON & corrosion monitoring workshop 2011

Stefan Ritter
Paul Scherrer Institute, Switzerland

**Fall Meeting of EFC WP 4 “Nuclear Corrosion”,
September 7, 2011, Stockholm, Sweden**

05 July 2012

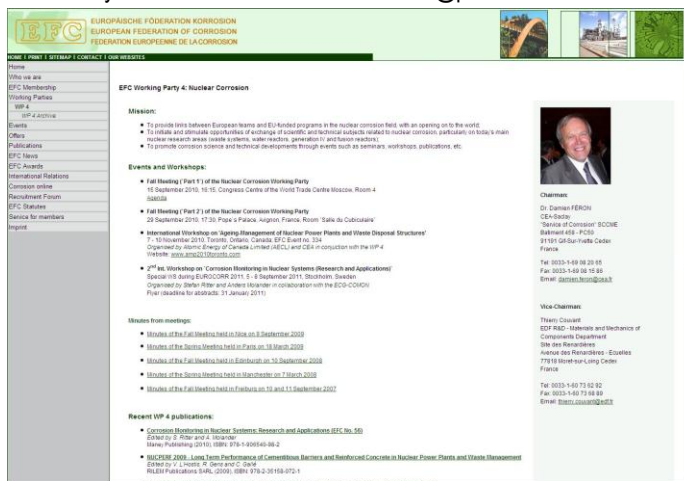
EFC WP4 Spring Meeting 2009

1



Status of EFC WP 4 website (www.efcweb.org) (I of II)

The WP 4 website is updated frequently! Please pass by from time to time and/or feel free to send events or any other useful infos to “stefan.ritter@psi.ch”!



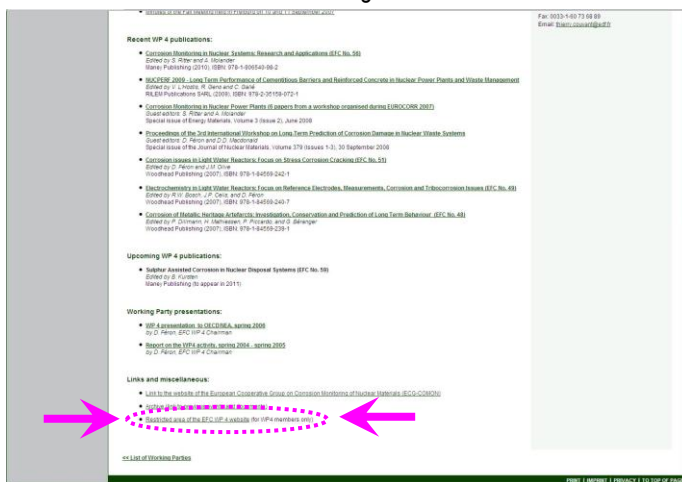
05 July 2012

EFC WP4 Fall Meeting 2012

2

Status of EFC WP 4 website (www.efcweb.org) (II of II)

A restricted area (for members only) has been added to the WP 4 website. The password will be provided with the minutes of the meeting.



05 July 2012

EFC WP4 Fall Meeting 2012

3

8th annual meeting of the ECG-COMON in 2012

- **Date:** June 18 and 19, 2012
- **Location:** The Netherlands (Petten)
- **What:** Presentations on corrosion monitoring techniques, discussions, round-robins, "networking", etc.
(for members and invited guests only)
- **Fun:** Sightseeing/bicycle tour (Sun., June 17), welcome reception (Sunday evening), conference dinner (Monday evening), etc.
- **More info:** See www.ecg-comon.org/meeting2012 (available from march 2012 on)



05 July 2012

EFC WP4 Fall Meeting 2012

4

2nd int. workshop on corrosion monitoring in nuclear systems

- **Date:** September 6, 2011
- **Location:** Stockholm, Sweden
- **What:** 9 presentations + 1 poster, audience: 45-50!
- **Publication:** Special issue of a journal (so far 5 papers)?

e.g.:



05 July 2012

EFC WP4 Fall Meeting 2012

5



**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
FÉDÉRATION EUROPÉENNE DE LA CORROSION**

Enclosure 6:

Document available only on the private space of the EFC WP4 website, for WP4 Members

- ✓ Annex 6 Presentation made by Thierry Couvant

EFC WP4 "NUCLEAR CORROSION"

Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
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Secretary	Mylène Belgome	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex

International workshop on Stress Corrosion Cracking of weld metals in PWR environment

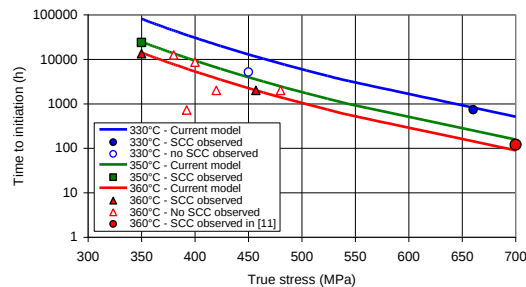


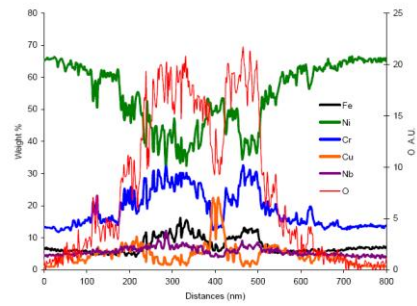
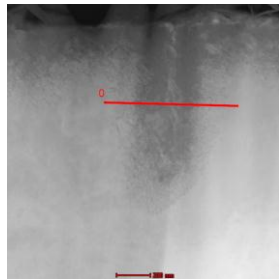
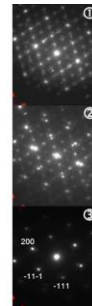
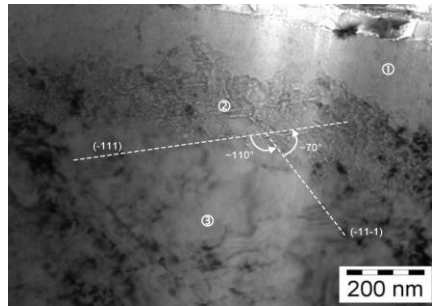
September, 2012
Les Renardières, Moret-sur-Loing (France)



Need to predict initiation for different loading, microstructures...

$$t_i = \frac{1}{i_m \times i_\sigma \times i_T} \quad \left\{ \begin{array}{l} i_T = \exp\left(-\frac{Q}{RT}\right) \\ i_\sigma = \sigma^{-7} \\ i_m = \text{calibrated on SCC initiation tests} \end{array} \right. \quad \left\{ \begin{array}{l} T \text{ en K} \\ R = 8.314 \text{ J.mol}^{-1}\text{K}^{-1} \\ Q = 185 \text{ kJ.mol}^{-1} \end{array} \right.$$







**EUROPEAN FEDERATION OF CORROSION
EUROPÄISCHE FÖDERATION KORROSION
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Enclosure 7:

Document available only on the private space of the EFC WP4 website, for WP4 Members

- ✓ Annex 7 Slides related to the LongTermCor2013 (Japan)

EFC WP4 "NUCLEAR CORROSION"

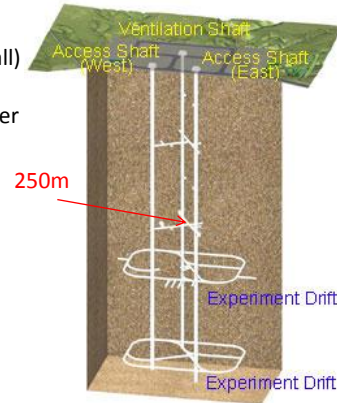
Chairman	Damien Féron	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex
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Secretary	Mylène Belgome	CEA/Saclay	DEN/DANS/DPC/SCCME	Bât. 458 - PC 50	F-91191 GIF SUR YVETTE Cedex

5th International Workshop on Long-Term
Prediction of Corrosion Damage in Nuclear
Waste Systems in Japan (Proposal)

Date 2013.10.7 – 2013.10.11
Place Asahikawa Daisetu Crystal Hall
(Asahikawa City International Conference Hall)
Asahikawa, Hokkaido, Japan
Tour JAEA Horonobe Underground Research Center



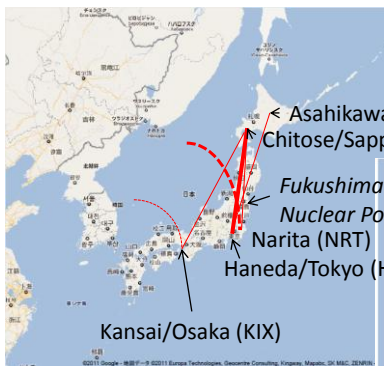
Asahikawa Daisetu Crystal Hall



JAEA Horonobe Underground Research Center

<http://www.jaea.go.jp/english/04/horonobe/index.html>

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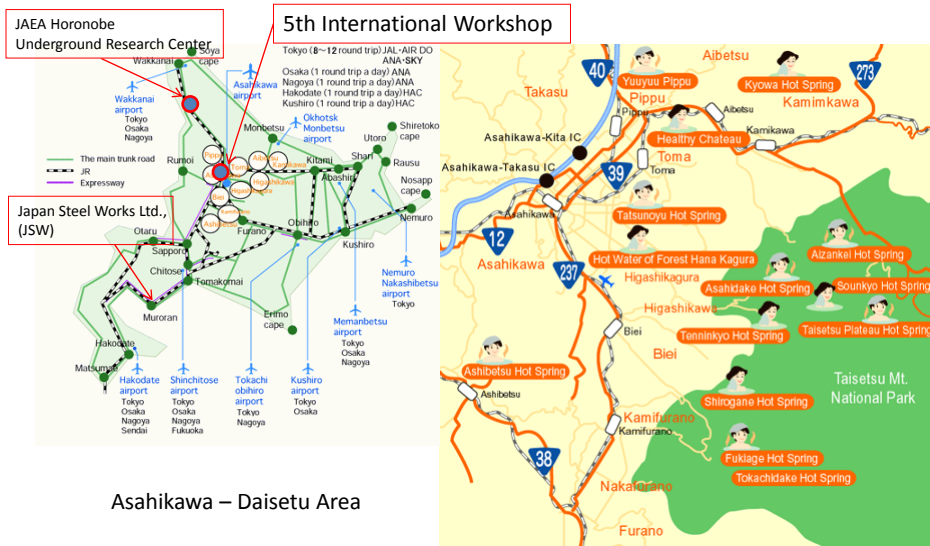
Pre-tour (Optional)

**Japan Steel Works Ltd.,
Muran (JSW)**

Large Steel Materials and Products
For power generating plants
Nuclear power plant components
<http://www.jsw.co.jp/en/index.html>



2



<http://www.asahikawa-daisetsu.jp/e/index.html>

3

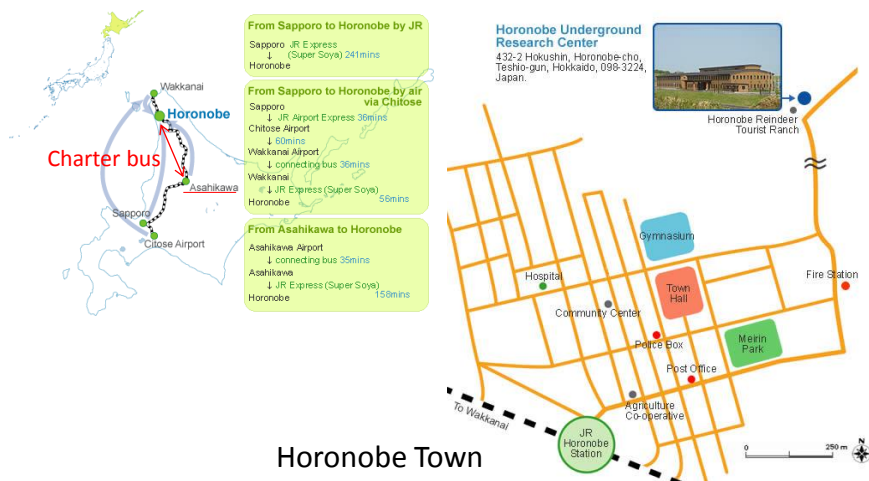
Asahikawa Grand Hotel
B-jo Don 9, Asahikawa TEL. (0166) 24-2111



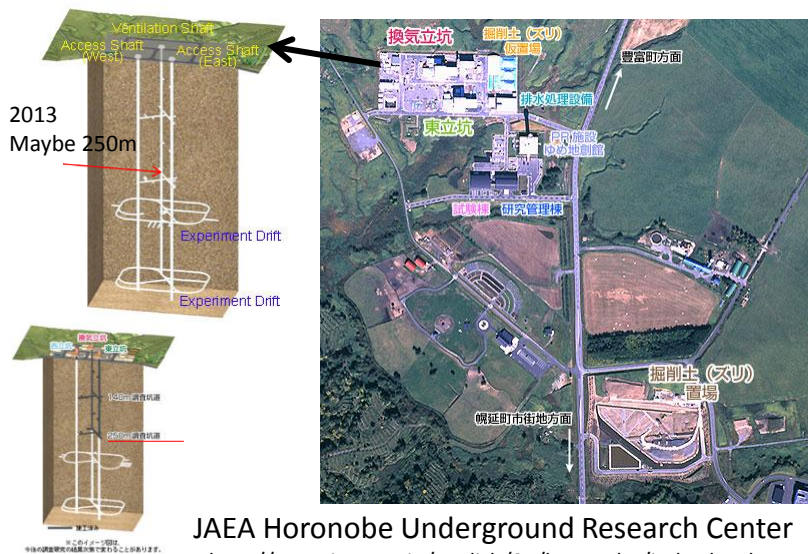
<http://www.asahikawa-grand.com/eng/informationAndMap/>

★: International Grade Hotel
○: Other Hotel Area

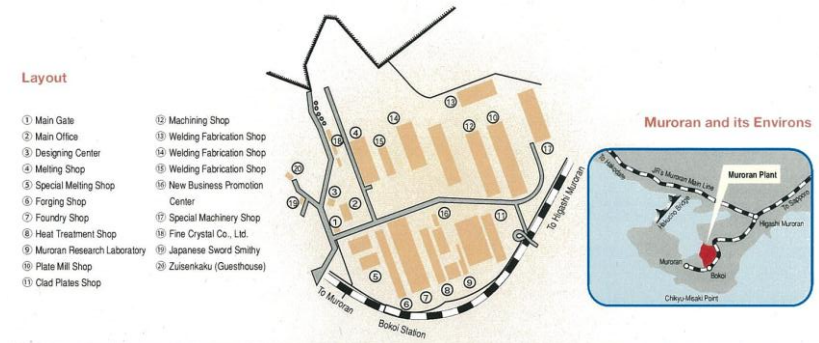




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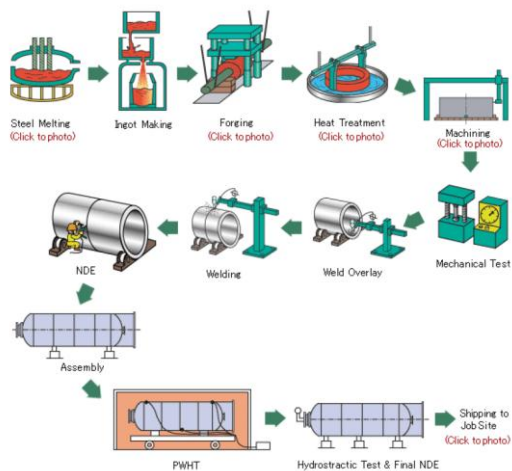


JSW Muroran Plant

*Japan Steel Works Ltd.,
Muroran (JSW)*

Large Steel Materials and Products
For power generating plants
Nuclear power plant components
<http://www.jsw.co.jp/en/index.html>

7



Shell Flange for
Nuclear Power Plant



Typical Fabrication Sequence of Reactor

*Japan Steel Works Ltd.,
Muroran (JSW)*

Loading of Hydro-Desulfurization Reactor
Used by 2-750 ton Private Wharf Crane at JSW
Muroran Plant

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