Attachment 8

Minutes of the PCC Working Group Meeting 25 - 28 August 2003

Monday 25 August 2003

1. Amendments / Adoption of Agenda

   The agenda was modified to include additional items with the required input target times as requested by the Executive committee at the plenary session.

2. Election of Clerk of Minutes

   Mr K McGrath was appointed.

3. Approval of minutes of 2002 Meeting in Buenos Aires, Argentina

   The minutes were approved.

4. International Collaboration

   K Daucik explained the process for producing a proposal for International Collaboration, which would seek IAPWS support for a Young Scientist to work in a member country. A Zeijseink suggested that we could not make a proposal by the Friday deadline at this meeting. Instead PCC members should actively consider making suggestions for a proposal for next year. A Zeijseink will via email make clear to PCC members what is required to produce a proposal and frequently remind members to actively pursue the objective of making a proposal. **Action A Zeijseink.**

5. Priority List

   The view of the members, after considerable discussion, was that the current list was in need of updating. A Zeijseink said that more action was needed to clear the existing ICRNs – many of which were felt to have generated work had already been reported on. Speaking for US National Committee J Bellows, suggested that PCC should take one issue from the list and work on it to produce a research plan that could be passed to PCAS Working Group. While many members felt this was a positive suggestion that would produce tangible results B Dooley suggested that PCC members should go further than this and that it is important to have a new list of topics. B Dooley's view was that PCC should provide information on the topic, which would assist PCAS and also provide

information on PCC's identified requirements to outsiders as a guidance document. A Zeijseink had not received any inputs on identified topics from any of the National Committees. G. Bignold said that BIAPWS had discussed the current list in committee and there were disparate views on plant type and respective needs given by the BIAPWS sponsors. A Zeijseink said that with a well-developed research proposal it should be possible to obtain funding. Some PCC members said it was important not to raise false hopes in PCAS that funding would be obtainable. To conclude the discussion A Zeijseink said that PCC needed to appoint a task force to work this week and develop the process for producing a proposal. J Bellows, L Olavessen and E Maughan were to be the task force members and report back to PCC on Thursday, 28 August. This group should also especially consider the types of output the PCC could provide for its own use and for interested colleagues, within and outside of IAPWS. As an example the provision of a CD-ROM with the presentation would be valuable. In summary, A Zeijseink said it would not be possible this week to have a new list since no National Committee had responded formally. He further advised that from within the PCC membership there are already ideas for a new list but these would have to be validated and formally submitted by the National Committees for next year's meeting. **Action A Zeijseink to contact National Committee Chairmen to progress input for a new list.**

6. Report on Future of IAPWS

A Zeijseink advised the PCC that the Executive Committee had requested input of PCC on the recommendations in the Report on the Future of IAPWS. R Svoboda was appointed as PCC representative on the Committee, which will be finalising the recommendations to the Executive Committee. **Action R Svoboda to represent PCC.** In discussion it was agreed PCC should try to invite members with nuclear interests / expertise to join PCC. It was recognised there was a need to offer interesting material and involvement to encourage new people to support PCC and IAPWS. **Action PCC membership to make suggestions to A Zeijseink.** It was agreed appropriate that the minutes would include a list of the presentations made at this year's PCC sessions. A Sengers said that PCC should take one of the presentation items and explain to PCAS members in such a way that they understand the issues and could then be better equipped to work out a solution. This would help collaboration between the two groups.

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7. Suggestion for Gibbs Award Nominee

In view of short time scale required by Executive Committee, A Zeijseink will ask permission to make an input by Thursday. **Action A Zeijseink.**

8. Joint workshop PCAS/PCC WGs Part 1 "*pH Measurements at Different Temperatures"*

The following papers were presented. Copies of the papers and further information can be obtained from the authors.

A. ZEIJSEINK	On the importance of pH measurements in Power Plant cycles.
J. BELLOWS	Calculation of pH from specific and cation conductivity.
E. MAUGHAN	Practical aspects of pH measurement.
D. PALMER, S. LVOV	Report on the pH of high temperature water.
S. LVOV	Can we measure pH of high temperature water outside a lab?
Y.V. ZHGENTI, D. PALMER, P. BENEZETH, D. WESELOWSKI, L. ANOVITZ	An experimental investigation of borate/lithium adsorption from solution onto zirconium dioxide fuel-cladding surfaces: model of AOA phenomenon.
G. BIGNOLD	A spreadsheet for calculation of speciation, pH and conductivity from measured concentrations of a range of anions and cations
H.D. PFLUG, E. MAUGHAN	Theoretical and practical aspects for the verification of carbon dioxide in the water-steam cycle of power plants.
S. UCHIDA	Development of high temperature water chemistry sensors.
H.D. PFLUG, E. MAUGHAN	Automatic on-line calibration method for pH of ammoniacal water circuits.

8.1 Following the presentations on pH issues, a discussion took place between PCC and PCAS members on the need for future work. The question was raised 'Do power plants need to have the facility to measure pH at high temperature?'. A Zeijseink noted that a lot of work had been carried out in the laboratory to develop a high temperature pH sensor. At the present time, in most instances power plants had chosen to measure pH at low temperature and not to adopt measurement at high pH. Some plants did not have instrumentation to measure pH but calculated a value from conductivity measurements. The only possible support for adoption of pH measurement at high temperature was from BWR plants and support unlikely from fossil plants. It was felt that power plant chemists accept the existing systems and use their readings. The question was raised 'If there are inherent inaccuracies should there be an aim to improve measurement capability?'. Answering this question was considered to be important for some nuclear plant chemists. S Lvov said that the Zirconia pH measuring equipment was not as simple as a conventional pH cell. It was expensive (USD50K), bulky and required to be fitted on a bypass system with a pump incorporated. Using such equipment would allow measurement of pH at

350C at better than +/- 0.1 pH units. He asked is there any need to proceed with development to meet power plant need? There was general agreement that an outline of a guidance paper on the needs for pH measurement in power plants should be prepared. The objective would be to produce the paper within oneyear. For the outline two representatives from industry would be Nuclear Plant - S Uchido and Fossil Plant - E Maughan together with three research representatives – D Palmer, S Lvov and D MacDonald. To produce the paper researchers and users would be involved in a Task Group. For the group the following names were suggested: - D Palmer, S Lvov, D MacDonald, A Zeijseink, G Bignold, H Corti, J Bellows and A Covington. **Action A Zeijseink to initiate the contact with the proposed nominees and progress the task to meet the one-year target for the guidance paper.**

Tuesday 26 August 2003

Joint Workshop PCAS/PCC WGs Part 2 "Chemistry in Ultra Supercritical Plant (USC) and Other Issues"

The following papers were presented. Copies of the papers and further information can be obtained from the authors.

A. ZEIJSEINK, K. DAUCIK	Issues and requirements for chemistry in USC plant from a European perspective.
B.D. DOOLEY	EPRI's materials program for USC.
T. KOBAYASHI	Practical experiences with USC Kawagoe Power Plant in Japan.
J.P. JENSEN, L.S. PEDERSEN	Water Treatment at Avedøre 2 - a USC boiler.
K. DAUCIK	Chemistry of Water/Steam Cycle in Elsam´s USC Units - Intentions and real experience.
A. ZEIJSEINK	Development of water chemistry guidelines for the European AD-700 USC plant
S. LVOV	Development of hydrothermal coating technology for corrosion mitigation in high temperature aqueous systems.
T. NEMEC, F. MARSIK, D. PALMER	Binary nucleation of selected power cycle and environmentally relevant water mixtures.

8.2 Following the presentations on Ultra Supercritical Power Plant issues, a discussion took place between PCC and PCAS members present on the need to develop an ICRN on USC water-technology. In opening the discussion, V Majer commented that at temperatures >500C physical chemistry experiments become more complicated and molecular simulation techniques could be a necessary solution. Working on aspects of importance for USC could be the future topic for the PCC / PCAS collaboration. S Lvov said that collaborative work had been started with Perboni to model behaviour at high temperature and low pressure. S Lvov offered (and PCC agreed) to give a short talk to PCC members on Molecular Modelling on Thursday 28 August. (Due to time restrictions this did

not restrictions this did not take place.) In some of the presentations on USC, materials testing rig work was described. Results from such work would influence and direct research needs. PCC members agreed that work for a PCC Task Group to define the USC issues, as a Guidance Document to issue to PCAS, is more long term than defining needs for pH measurements. A. Zeijseink said he would seek out opportunities for PCC members to meet during the coming year and produce the guidance paper needed to inform PCAS of the likely research needs. In the event that it was not possible to meet before the 14th ICPWS in Japan in August 2004, A Zeijseink would convene a workshop meeting of PCC members to discuss the topics and produce the guidance paper. **Action A Zeijseink to convene appropriate meeting, and progress production of guidance paper.**

9. Technical presentations/progress reports

The following papers were presented. Copies of the papers and further information can be obtained from the authors.

Monitoring	
E. MAUGHAN	On-line monitoring, technologies available and the do's and don'ts.
S. UCHIDA	Water Chemistry Data Acquisition, Processing, Evaluation and Diagnostic Systems in Light Water Reactors - Latest Experiences with Japanese LWR Plants -
Organics	
T. PETROVA - Dsc, prof. (MPEI (TU)) SONIYA VIDOIKOVICH – PhD	The effect of organic species on the contamination of saturated steam with sulphate and fluoride.
R.R. HARRIES	The distribution of organic matter in the steam/water cycle.
R. SVOBODA	Early condensate measurements in Staudinger Power Plant.
Corrosion	
G. BIGNOLD	Corrosion Risk Assessments - How do other ions such as sulphate, bromide, acetate and formate compare with chloride?
R. SVOBODA	Fluoride in power cycles.
M. ZMITKO	Water chemistry and corrosion process monitoring during hot functional tests of Mochovce and Temelín NPPs.
STASTNY M., BLAHOVA O., SIMUNEK D.	Copper Deposition and Surface Structure of the Steam Turbine Blades.
Phosphate treatment	
M. BALL	Some thoughts on Phosphate Treatment.
B. HUGHES	Plant measurements leading up to the accurate calculation of sodium phosphate ratios.

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Thursday 28 August 2003

10. 14th ICPWS Proposed Programme Titles for 2nd Announcement

A Zeijseink had been requested by the IAPWS President to review the PCC related titles in the 1st Announcement and redefine them so that there were less topics listed. It would be essential that the topic titles were meaningful and recognisable to potential authors. The suggested new titles were as follows:

1 Power Cycle Chemistry in Conventional, Combined and Advanced Cycles.
2 Power Cycle Chemistry in Nuclear Cycles.
3 Water Purification and Other Plant Auxiliary Systems.
4 Steam chemistry, Condensation and Deposition.

It was further suggested that the title 'Properties of Aqueous Systems of Industrial and Geochemical Interest' should be amended to 'Properties of Aqueous Systems of Industrial and Geochemical Interest including Geothermal Energy'. PCC members pointed out that under the present IAPWS scope of work they had 'difficulty' including Renewable Energy within the titles. It was also considered that the title General Topics on Water, Steam and Aqueous Systems should be identified to include Chemical Monitoring Instrumentation and Chemical Analysis. In connection with the above titles the PCC members suggested the names of potential speakers. A Zeijseink noted the names and will pass them onto the Organising Committee. **Action A Zeijseink**
In regard to Ultra Supercritical Power Plant issues there was a suggestion that a Workshop (with a structured programme) could be incorporated into the 14th ICPWS Meeting. In this way informed input on USC issues could be made and the Task Force would be 'brought up to speed'. No commitment was made to this suggestion, which A Zeijseink will put to the Organising Committee.

11. Conclusion on "Future of IAPWS"

R Svoboda reported back from his meeting with the group working on the proposals for the Future of IAPWS. He advised the PCC meeting that there would be four new Committees set up to formulate input on the following issues: -

1 Nuclear Power
2 Fuel cells
3 Effectiveness of ICRNs
4 IAPWS Awards

In addition there would be five task groups namely as follows: -

1 Properties and Formulations for High Temperature Aqueous Systems
2 Electrochemical Processes in High Temperature Aqueous Systems
3 Education and Outreach
4 Environmental Issues
5 Metastability, Nucleation, Early condensation, Droplet sprays and Cavitation

R. Svoboda advised that members of these committees and groups would be sought from the various IAPWS Working Groups and outside experts possibly coopted.

12. Process for Priority List

J Bellows presented the proposed Process for the Priority List and Development of ICRNs. The document is attached to these minutes as Attachment A. The PCC members reviewed the stages in the proposed process and accepted that this was a suitable document, which the PCC should apply to future issues. It was recognised that in the use of the document some fine-tuning of the process would be applied as necessary.

13. Guideline from EBA, discussion of draft water chemistry guideline

K Daucik advised the meeting that several PCC members were involved in the drafting of the guideline alongside boiler and turbine manufacturers' nominees. Progress was being made and he expected the guideline would be available for issue in 2004. The organisation producing the guideline was now known as European Power Plant Suppliers Association. Members expressed the view that they would like to gain some knowledge of other countries guidelines.

14. Topics for next year's PCC meeting

A Zeijseink advised members that he wished to encourage members to come to the IAPWS Meetings and contribute both to the tasks set to meet identified issues and to participate in Technical Presentations. K Daucik pointed out that at the ICPWS meeting the time allocated to the Working Groups would be limited and it was likely that the PCC Meeting would be reduced to dealing with organisational matters only. The members generally agreed that in future PCC Meetings there should be a limited number of presentations focussed on a particular topic or set of related topics.

15. Membership

A Zeijseink advised members that he would write to those PCC members who had not attended a PCC Meeting in the previous three years and ask them to confirm their interest in remaining a member of PCC. After new attendees had attended two meetings in a three-year period they would be invited to become members of PCC. **Action A Zeijseink**

16. Election of Officers

There was no requirement to elect officers at this meeting.

17. Preparation of the Report to EC

A Zeijseink will prepare a report on the PCC activities for presentation to the Executive Committee meeting on Friday 29 August. **Action A Zeijseink**

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18. Miscellaneous and Adjournment

There was no further business. A Zeijseink thanked the presenters of the papers at this meeting of the PCC. He expressed his thanks to all the members for attending and the assistance given to work on the tasks, which had been requested by the Executive Committee on Monday at the Opening Session. A Zeijseink declared the meeting closed.

PCC Attachment A

Process for Priority List

Using information available at meeting

- Problem suggestion [Monday]
- First screening—define problem more carefully
  - Is the problem widespread?
  - Is there a known root cause or most probable cause?
  - What is already known and who knows it?
- First task group (usually PCC only)

(Now on tentative (PCC private) priority list)

  - Will usually include suggester
  - Problem redefinition based on screening
  - What information do we really need?
  - What is the case for going forward (return on investment)?
  - What is (are) the best way(s) to tackle the problem?
  - What is the technology gap? What are the technology options?
  - What are the remaining questions?
- Second task group [Wednesday]
  - Now includes members of other working groups (usually but not necessarily PCAS)—found by first task group with aid of chairmen of other working groups
  - Sketch research plan
  - Evaluate practicality and possible effort level required for a solution
  - Plan ICRN's
- Review by working groups [Thursday]

(Now on priority list)

Using best information:

- Create ICRN's [Monday of next year] and lobby for funding
- Do research
  - Midstream value review if more than one year long
- Publication with view of application
  - Patents if appropriate (must be exercised)
  - Journal articles
- Closure of item by report to working groups
  - Includes evaluation of cost and probable value
- No action in 3(?) years => drop off priority list
- Priority list agenda item includes progress reports on the current priority items