

Power Cycle Chemistry Working Group (PCC WG)
Prague, Czech Republic, September 2, 2018
11:00 – 17:00

1. Amendments / Adoption of Agenda

Attendees were welcomed by Rziha. The agenda was adopted with no changes.

2. Appointment of Clerk of Minutes

Paul McCann was appointed as clerk.

3. Approval of Minutes of PCC WG in Kyoto, 2017

The Kyoto minutes circulated previously by Rziha were accepted with no changes.

4. Review of Actions from last PCC WG Meeting

The only actions were related to the IAPWS TGDs. These are covered in the next section. Rziha noted that the TGDs are being increasingly accepted worldwide as international standards.

5. IAPWS TGDs

This session was chaired by Dooley. Dooley provided background on the purpose of the TGDs which is to be the basis of guidelines worldwide. The benefit of IAPWS documents is that they bring together both academia and industry to provide scientifically robust guidelines. Dooley requested that the separate TGD WGs arrange to meet during the ICPWS week to progress activities.

5.1. Air in-leakage in Steam-Water Cycles

A draft TGD has been written and circulated to the full TGD Task Group and PCC WG for review with comments back now addressed. Input was also received from Anderko and Fernandez-Prini from IAPWS for input on thermodynamic principles. The draft TGD is currently at Editorial Review.

Action Rziha: To request EC to send the draft TGD to National Committees for postal ballot for final approval. This is to avoid delaying approval to the 2019 IAPWS meeting.

5.2. Film Forming Substances (FFS) for Industrial Plants

This is a complimentary document to go with the existing TGD for fossil plants. A draft document is largely finished but input is still needed from the industrial sub-task group (STG). The document proposes to introduce the term film-forming substances (FFS) as suitable nomenclature to cover the range of chemicals available. The STG will meet during the ICPWS to discuss how to progress and to agree a timeline for activities.

5.3. Film Forming Substances (FFS) for Nuclear Plants

Fandrich (Framatome) has joined the STG. The aim is initially to produce a white paper. A skeleton document has been produced and the STG will meet during the ICPWS to assign writing tasks. Although Dooley noted that only ODA has been used in nuclear plants to date, Cook (STG chair) confirmed that the

IAPWS document will not be product specific so should be of wide benefit. STG membership: McGee (Candu Owners Group) is no longer participating; Stuart (Canadian Nuclear Laboratories) has joined.

5.4. Demin Water Integrity

Joy (STG chair) reported that a skeleton for the TGD has been developed and drafts have been written for 6 out of 15 sections. Hirano has done much work and will present this during the ICPWS. Christiana Holl (Hydro Engineering) has joined the STG to contribute writing. Bellows is no longer participating. The STG will meet during the ICPWS to progress.

5.5. Corrosion product (CP) sampling and analysing (white paper)

Thomsen (STG chair) provided an update on developing the existing TGD to cover flexible plants. Initial planning was done in Dresden to identify gaps, particularly for field sampling, analysis and benchmarking. Since then, much work has been done on load transients at plants using conventional chemistries.

An international collaboration has been set up to conduct further field tests and a student appointed – Maja Skou Jensen (Aarhus University, Denmark) - who will be supervised by Thomsen. Further work is planned to qualify proxy measurement methods and to benchmark CP decay rates at startups.

The aim is that a ‘decay map’ could be produced that could be used by sites to optimise preservation and startup chemistry. The aim is to update the CP TGD for the 2019 IAPWS meeting. A draft white paper has been prepared with suggested updated contents list for the revision.

Dooley requested that the STG consider if CP levels at plants using FFS should be included as the scientific understanding of FFS still needs to be developed and also if guidance for CP monitoring for flexible plant should be covered under a new TGD. Rziha noted that spalling of oxides from superheater stages also requires guidance as this is a mechanical (not chemical) effect but can be an important cause of particle erosion at startups.

Henderson (AUSAPWS) requested that CP decay rates are included in the TGD revision and consideration given to guidance on the corrective actions this could promote.

Witney (GE) and Powalisz (Sentry) requested to join the STG.

5.6. Geothermal (white paper)

Addison (STG chair) reported that significant work has been done on steam purity and information will be consolidated into a White Paper in 2018. For subsequent TGD updates on steam purity and sampling, the PCC WG recommended that a separate standalone TGD be produced for geothermal plants.

5.7. Condensate Polishing for HRSG Plants (white paper)

Khalifa reported that a skeleton document has been produced with 15 sections and that draft text had been written for initial STG review. Due to the amount of work required, additional members were requested to help writing. The initial aim is to produce a white paper to discuss if the topic is worth developing into a TGD. For STG membership, Witney will deputise for Leidich (GE) and Henderson will replace Joy (AUSAPWS). Dooley noted that the purpose of the document is to provide technical guidance on how to apply condensate polishing at HRSG plants, not to produce a design document.

5.8. Proposals for new TGDs

A new TGD has been proposed by Svoboda and Dooley on “Chemistry Management in Generator Water Cooling during Operation and Shutdown” (Svoboda chair). A first skeleton has been written. Henderson and Witney volunteered to join the STG. The intention is to publish in 2019.

Henderson proposed a new TGD in laboratory management and instrument validation following feedback from AUSAPWS.

A TGD on chemical cleaning was discussed. It was felt that guidance on general cleaning procedures was not within IAPWS remit. However, possible guidance on when to clean supercritical boilers with duplex oxides could be considered in the future.

Action Henderson: To provide a skeleton of possible content for a TGD on laboratory management for the PCC WG to consider.

5.9. Updating Published TGDs

The additional of modern guidance on control of aluminium for plants with Heller air-cooled condensers was proposed by Dooley for the Volatile TGD.

6. Short joint session of IRS/PCC/PCA on Report of the Task Group “Categories of industrial requirements”

Okita (Toshiba, TG chair) provided a brief explanation about the purpose of the task group which is to collect, sort and categorise possible items of IAPWS interest, e.g. requirements for wetness measurements for wet steam properties in steam turbines; in HRSGs, measuring acid dew points in flue gas with low sulphur content. Items have been categorised and sorted with a potential IAPWS output. Other topics suggested by the PCC WG included the effect of FFS products on droplet surface tension in steam turbines as this is a field in which there is little data.

7. Progress Reports 2017/2018 and Future PCC Activities

Main activities are the further development of the TGDs as described above.

8. International Collaboration

There are two current collaborations:

Cook/Addison – Test rig at the University of New Brunswick (Canada) on corrosion of boiler steels in presence of mixed contaminants (chloride, sulphate). The aim of the work is to verify or adjust boiler limits. The test rig has been set up and experiments completed. The preliminary data is promising and will be reported at the ICPWS. Schedule and budget is on track. Consideration will be given to proposing a student placement to expand the work.

Thomsen - Maja Skou Jensen (Aarhus University) has been appointed. This will form a 1 year Masters degree project. A preliminary programme has been drawn up and will be finalised at the ICPWS.

There were no proposals for new collaborations.

9. ICRNs – Review and Possible New Additions

Action Rziha: Status of ICRN#22 “Steam Chemistry in Turbine Phase Transition Zone” to be confirmed.

No new ICRNs were proposed.

10. PCC Public Relations / Contribution to Press Release

The PCC WG has been active with TGD production. IAPWS has also supported various events worldwide to raise awareness of IAPWS. The conference on FFS in Prague was highlighted as being particularly successful. The presentations are not directly available to IAPWS members but can be purchased from the PowerPlant Chemistry journal for half of the registration cost. The next FFS will be held in March 2019 in Heidelberg, Germany. For the ICPWS, the press release will be prepared by Cook (University of New Brunswick).

11. Changes in PCC Membership and Election of Officers

The following WG members were elected:

Hayden Henderson (AGL / AUSAPWS)
Luke Mosele (AUSAPWS)
Craig Stuart (Canadian Nuclear Laboratories)
John Powalisz (Sentry)
Joerg Fandrich (Framatome)

Michael Rziha was elected to continue as WG chair. There are two vice-chairs: Paul McCann continues; David Addison was elected as new.

12. Adjournment

ENDS