# IAPWS 2017 Kyoto
## Minutes of PCC meeting 10:30AM Monday, Aug 28th 2017

- Agenda from past meeting was adopted; minutes from Dresden meeting are available on IAPWS website, no objections were noted, minutes adopted
- From 2016 minutes re: TGDs' action items: one action on the ICRN26 (aluminum alloys use in cooling towers) action was to provide overview at Kyoto meeting; no input noted - to be carried over to next meeting in Prague
- On the topic of international collaboration……K. Thomsen presented on TGD of "Monitoring of corrosion products on flexible plants"….concluded that much further work is required before confident to convert it into a TGD; AUS/NZ and SIAPWS. PCC decided it is necessary to work for 6+ months to develop database to develop such confidence….joint proposal will be made to the EC; Rziha notes that such work is critically important in CCPP worldwide. Critical to gain more knowledge on how these waves of oxides by pressure variation, loads, chemistry; also with layup strategies. Path forward is to circulate printed version of TGD, add a contract student (Aarhus Univ.); particle size distribution evaluations to be included
- B. Dooley provided background to PCC newcomers on TGDs; PCC Group has been working on TGDs since 2008, have become international standards around the world for conventional fossil and CCP plants, and also biomass (at request of SIAPWS); has expanded access by plants to this invaluable information worldwide; there are currently 8 TGDs (TGD-01-08, TGD2-09/2015, TGG3-10; TGD4-11/2015, TGD5-13, TGD6-13/2014…..TGD7-16, TGD8-16); reminds all that before a TGD can be introduced, a lot of data has to be evaluated (a rigorous process); discusses HRSG HP Evaporator Tube selection for both HGP and VGP-type HRSGs; there is an IAPWS "deposition map" available giving deposit loading vs Pressure…..useful to determine chemical cleaning, encompassing a 150-plant database ; described base case vs. Customization of each TGD
- B. Dooley further expanded on rigorous process for TGD, its truly international character, both in perspective and direction; it follows a process of draft/circulation/many revisions/editorial committee/then to 24 national committees /EC approval…..ultimately leads to an International Standard
- TGDs planned for next 12 months: Demin water Impact in Steam Water Cycle, Air In-leakage Impact on Steam Water Cycle, FFP for Industrial plants, FFP Nuclear Secondary, plus 2 white papers; white papers can transition into TGD in 1-3 years.
- Refreshment of published TGDs need to reflect "state-of-the-art expertise"
- M. Rziha asks for suggestions for new TGDs; B. Dooley explains timeline for current set of TGDs-in-waiting
- Kirk Buecher - is there a set date for implementing TGDs? within IAPWS, B. Dooley states No, only ICRNs have set deadlines
- K. Thomsen 1st presentation: Update on TGD CP sampling & analysis (Results of field testing) - "Monitoring Corrosion Products in Flexible (cycling and two-shifting) Plants"'

- M. Nielsen presented "Corrosion Product Monitoring By Online Turbidity, Total iron & Filtration Samples"; followed by K. Thomsen 2nd Presentation – Update on TGD CP sampling & analysis (focusing on statistical distribution aspects" - "Distribution of Particles and CP concentrations"
- M. Rziha asked if there were objections to the submitted international collaboration project; None were noted, M. Rziha proposes submitting a formal application to IAPWS Executive Committee (EC)
- Presentation given by J. P. Jensen "Permit for discharge of excess water to recipient - Flue gas condensation"
- Presentation given by Zhang Xiaoni on High-salinity Water Reuse in Coal-fired Power Plants
- Presentation by Xuxiang Jia (Wuhan University) on "Hydrodynamics/Kinetics Study on Flow Rate and Expansion of Ion-exchange Resins"
- Presentation by G. Joy on progress of TGD on Demin Water (fossil & nuclear) - "Ensuring the Integrity and Reliability of Demineralized Makeup Water Supply to the Unit Cycle"; pledge made to accelerate progress of this TGD and publish at EC meeting in Prague, 2018.
- Presentation by L. Carvalho on progress of TGD on Air In-leakage In Steam Water Cycles; Carvalho presented skeleton of TGD and current 13-page TGD draft; AIL subcommittee (Carvalho-Chair; Dooley/Rziha/Thomsen) will meet the following day in break-out session to finalize TGD writing assignments. Monika Nielsen asks to be excused from further subcommittee work due to work load; Carvalho asks if there are more volunteers to join, none noted at the meeting.

Day #2 Tuesday, August 29th 2017

- Presentation – "Fundamental Investigation on powder scale occurring in OT plants"
- W. Cook gave an update on Canada/NZ International collaboration project; Electrochemical Corrosion Study, based on two ICRN (ICRN 25 & ICRN 20); matrix needed to try to match various Action Level guidelines around the world (Dooley). Work done @17MPa/sat. T 332C; W. Hater asked if organic acids will be tested on this rig? Cook: YES, and possibly filming amines effects but this is not a priority right now;
- W. Cook made a 2nd presentation - Concept of HEPro Measurement….
- W. Hater presented on Film Forming Amine Products (FFPAs); "Introduction to the TGD for FFP in Industrial Plants"; discussion followed on potential additional TGD on FFP for closed loop cooling and heating systems – justification based on a different philosophy than boilers, lower temperature system; B. Dooley stated that there is now the issue of the use of FFPs that are not "amine-based"; the subcommittee members present in Kyoto (Hater, Rziha, Dooley, Carvalho, Dosan of Kurita) will meet in a separate meeting on Wednesday 10AM) to discuss issue of "non-amines" in TGD
- W. Cook gave an update on Film Forming Amines and FFPs for use in the Second loop of Nuclear (PCC Nuclear Subcommittee FFP task group); discussion stressed differences around steam generator integrity in nuclear field and "nuclear qualification" around chemical impurities, etc.; also that a white paper is a better approach (rather than TGD), this should be done for the 2018 Prague meeting to decide direction; issue ICRNs for key parameters; B. Dooley suggested getting Anderko & P. Tremaine (from PCAS) to look at chemical properties aspect; Cook states that only nuclear secondary loop is included; Dooley states IAPWS can take a leadership position in developing a white paper on this topic; there is an AREVA program using ODA; there is an EPRI study by K. Fruzzetti; IAPWS white paper should go ahead

- M. Sedlar gave a presentation on "Cavitation Phenomena In Balancing Drums of High-performance Feed Pumps"
- Naoko Yamaguchi presentated on "Features & Problems of Geothermal Steam Turbine Cycle"
- Yoshitaka Kawahara presented on "Novel Technology for Silica Scaling Control in Geothermal Plant"; B. Dooley formally invited Naoko Kawahara to join TGDs on Geothermal and IAPWS; also that there is a need for an ICRN;
- PCC – breaks up into sessions in the afternoon for TGD working groups

DAY 3 - Wednesday, Aug 30th 2017 - no PCC activities due to main IAPWS symposium program

DAY 4 – Thursday Aug 31st 2017

- **PRESENTATIONS:**
  - "Review of Different Demineralization Technologies for Low Salinty Water in the Power Industry" - Moataz Khalifa
  - "Proposal for new TGD for Condensate Polishing" – Moataz Khalifa. Discussion:
    - White Paper under preparation – target Q2 2018.
    - TGD skeleton prepared for Prague meeting.
    - Considered too large a scope for proposed TGD as presented.
    - Agreed content:

      1. Do one generation system type – CCGT – including conventional or an Air Cooled Condenser or a Heller tower.

      2. Not a detailed design manual

      3. Cover essential elements to consider in deciding whether to include a polisher (CPP) in a plant, and key features on operating CPP

      4. Include decision considerations in installing or retro-fitting a CPP

  - Task Group members:
    - Moataz Khalifa – Chair
    - David Addison
    - Kirk Buecher
    - Karsten Thomsen
    - Frank Udo Leidich
    - Gary Joy
- "Update on Corrosion product TGD" – Karsten Thomson. Covered modification of previous presentation based on comments made at the meeting – to include a peak level assessment for the various start up steps.

- **17th ICPWS:**

Reviewed and assigned promoters for the nominated ICPWS PCC sessions:

1. IAPWS Technical Guidance Documents (TGD's) (Dooley, Rziha)
2. Re-use of Water and Water Savings (Rziha, Karsten Thomsen, Joergen Peter Jensen)
3. Chemistry in Geothermal Plants (Addison, Kawahara, Yamaguchi, Tomarov, Rziha)
4. Chemistry in Nuclear Plants (Cook, Adam Caswell, Ishihara, Rziha)
5. Chemistry in Combined Cycle and Fossil Fired Plants (Rziha; Dooley, Leidich, McCann; Hirano; Tian Li)
6. Film Forming Amines and Film Forming Products (Hater, Lendi, Dooley, Keith Fruzetti, Rziha)

- **ICRN REVIEW**
  - ICRN 22 – Steam Chemistry in PTZ

    Date Extension Statement to be sent to Editorial Committee – to extend to September 2018.
  - ICRN 29 – Corrosion Product Transport. Work finalized by Derek Lister. Date Extension Statement to be sent to Editorial Committee – extend date to 2021.
  - No new ICRNs proposed.

- **DISCUSSION OF FUTURE PCC ACTIVITIES**
  - PCC / PCAS INTERACTION:
    - Previous discussion with PCAS to look at Film Forming Amines and Products, and for Andre Anderko (PCAS) to discuss with Peter Tremaine about work proposals.
    - Proposal for the 2018 and 2019 Meetings:
      - Continue with Joint workshops
      - But include a discussion time slot to discuss key PCC issues for PCAS
  - OTHER ITEMS:
    - Proposal for an ICRN on FFA and Products
    - Proposal for TGDs to show the review process. Noted that all current TGDs have been revised except – TGD1 Boiler Carryover.
    - Discussion on whether White papers could be available on IAPWS website. At present White Papers considered as Working Documents and could be available on OPAL. Could consider publishing a White Paper if a TGD is not prepared. To be considered on a case by case basis.

- **PCC PUBLIC RELATIONS:**
  - Encouragement for PCC members to promote IAPWS and PCC.
  - Propose to publish PPChem document on PCC meeting.
  - PCC already supports international conferences on HRSGs and FFP

- **CHANGES IN PCC ELECTED OFFICERS:**
  - No changes to PCC elected Officers

- **PROPOSED NEW PCC MEMBERS:**
  - Adam Caswell – EdF, UK
  - Steve McGee – Candu Owners Group (COG), Canada
  - Tian Li – TPRI, China