Minutes of Meeting for the Working Group
Industrial Requirements and Solutions (IRS)
Plzeň, Czech Republic, 04-09 September 2011

Remark: Most of the IRS meetings were held as joint meetings with TPWS (marked by *). Of these joint meetings the IRS minutes cover the topics chaired by the IRS chairman.

1. Opening Remarks; Adoption of Agenda.
Chairman I. Weber welcomed the WG members to Plzeň. The agenda was adopted.

2. Appointment of Clerk of Minutes.
P. Murphy was appointed clerk of minutes.

3. OPAL Web Space for Working Material. *
See TPWS minutes.

4. Potential International Collaborative Projects. *
See TPWS minutes.

5. Release on the IAPWS Formulation 2011 for the Thermal Conductivity of Ordinary Water Substance. *
See TPWS minutes.

6. Revised Supplementary Release on Properties of Liquid Water at 0.1 MPa.*
See TPWS minutes.

7. Industrial Requirements and Solutions for Steam Property Calculations.

7.1 Report of the Industrial Requirements Task Group.
I. Weber presented a brief history of the Task Group. There was no activity during the last year. I. Weber proposed changing the name of the TG to "New Industrial Requirements TG". The scope of this TG has been proposed to be "to collect new industrial requirements regarding formulations, properties, and fluids". The WG agreed to these changes. I. Weber was elected Chair, replacing W. Parry.
New TG Membership: I.Weber (chair), W. Parry, B. Rukes, M. Hiegemann, R. Mares, N. Okita, H.-J. Kretzschmar, K. Miyagawa, P. Murphy and M. Kunick

7.2 Report of the Industrial Survey Task Group.
I. Weber reported that there were no activities to report. P. Murphy was elected Chair, replacing W. Parry.
New TG membership: P. Murphy (chair), W. Parry, B. Rukes, M. Hiegemann, A. Novy, N. Okita and J. Cooper

7.3 Using IAPWS Formulations in Power Cycle Calculations with the Program EBSILON.

R. Pawellek gave a brief history of STEAG Energy Services and the EBSILON program. He then showed how IAPWS formulations are used inside of EBSILON. He then gave a demonstration of the capabilities of EBSILON with 3 different power plant models.

7.4 Steam Property Calculations for CFD Applications.

P. Murphy presented the results of CFD analysis using steam property calculations. He showed the need for faster steam property calculations, the impact on the CFD results of metastable steam properties, and the results of sensitivity studies on the size of steam look-up tables and interpolation routines.

7.5 Implementation of TTSE in power plant transient simulation software - experiences and results.

J. Bonifay presented an overview of the Plant Dynamics Group in Siemens and the Siemens power plant transient simulation software Dynaplant and Dymola. He then showed how TTSE steam table lookup routines have been added to the software. He presented results that show that TTSE steam table lookup routine is 10 times faster than the IF97 formulation.

7.6 Other Backward Equations with Different Independent Variables for IAPWS-IF97.

J. Cooper talked about the potential need for an industrial formulation using density and internal energy as the independent variables for use in CFD. J. Hruby stated that he was working on such a formulation. A CFD Steam Property Formulation TG has been formed to investigate if this formulation is sufficient for CFD calculations. This TG consists of J. Hruby (Chair) and P. Murphy

8. Properties of Humid Air and Humid Combustion Gases for CCS Technology. *

R. Span gave a brief history of ICRN-14. The closing statement for ICRN-14 was then reviewed. The WG agreed to recommend to the EC that ICRN-14 be closed.

R. Span then gave an overview of the proposed ICRN for the properties of humid air and humid combustion gases for CCS technology. The proposed ICRN is focused on CCS technology, and more specifically requirements resulting from oxyfuel process. The WG agreed to recommend to the EC that the new ICRN be adopted, pending review of the editorial committee.

9. Guideline on the Properties of Sea Water for Industrial Use. *

See TPWS minutes.

10. Properties of Sea Water*

See the minutes of the Subcommittee on Seawater.

11. Dew Point of Combustion Gases.

N. Okita gave an update on ICRN-23. Two papers have been published in the Oil and Gas Journal on this subject. The two equations presented have been investigated by the Japanese national committee. This evaluation cannot be completed without access to the data used to determine the equations. Repeated attempts to contact the author have been unsuccessful. The WG agreed to recommend to the EC that ICRN-23 have a 1 year extension. The WG also agreed to recommend to the EC that IAPWS contact the Oil and Gas Journal to help contact the paper author.

12. Metastable Steam and Nucleation, joint with WGs TPWS, PCAS, and SC SW. *

See TPWS minutes

13. Suggestions for IAPWS - CCT Collaboration. *

See TPWS minutes.

14. Discussion of Main Topics for 16th ICPWS 2013 in London*

See TPWS minutes.

15. Reports on Other TPWS, IRS and SC SW Activities

15.1 Updated IRS mission statement

The IRS mission statement has been updated as follows:
"To identify and prioritize industrial requirements for water, steam, and aqueous systems, to work with other IAPWS working groups to deliver solutions and to support implementation of solutions."
The IRS WG agreed to recommend to the EC the updated mission statement.

15.2 Guideline on Fundamental Constants. *

See TPWS minutes

15.3 Update of Advisory Note # 2: Roles of Various IAPWS Documents. *

See TPWS minutes

15.4 Changes to IAPWS By-laws

By-law changes were presented by A. Harvey. IRS agreed to recommend to the EC the proposed changes to the By-laws.

15.5 Gibbs Award Committee

J. Cooper was selected as the IRS WG representative on the Gibbs Award Committee.

15.6 Report of Advisory Note Task Group*

I. Weber reported that the TG had no activity the past year. It was recommended to keep the TG active, with the following changes: M. Hiegemann replaces W. Parry as Chair of the committee, P. Murphy added to the committee.
New TG membership:
M. Hiegemann (chair), W. Parry, B. Rukes and P. Murphy

15.7 Web presentation of Releases, etc. (A.H. Harvey)*

See TPWS minutes

15.8 Links to Live Calculations of IAPWS Releases on IAPWS Website*

See TPWS minutes

15.9 Steam Tables for Excel®, Mathcad®, and Pocket Calculators for Education on the IAPWS Website. *

See TPWS minutes

15.10 Liaison with IEC.*

See TPWS minutes

15.11 Discussion about IAPWS Meetings Regarding Locations and Costs. *

See TPWS minutes

16. Other Business

-Report on International Collaborative Projects *

See TPWS minutes

17. Membership

P. Murphy nominated A. Singh as a member of the IRS committee, J.M.H. Levelt-Sengers second the nomination. The WG elected A. Singh as a member of the IRS WG.

18. Preparation of the Press Release

Chairman and Clerk of Minutes prepared the IRS contribution to the Press Release

19. Preparation of the Formal Motion to the EC

Chairman and Clerk of Minutes prepared the report to the EC

20. Adjournment

Chairman I. Weber adjourned the meeting 2011-09-08, 17:10

Minutes

IAPWS Subcommittee on Seawater (SCSW)

Plzeň, Czech Republic, September 5-8, 2011

NOTE: These Minutes include some items that were held jointly with the TPWS and/or IRS Working Groups. Items are listed according to their order on the SCSW agenda, which is Attachment A. **Bold print** denotes significant actions.

1. The meeting was opened on Monday, September 5 by the SCSW Chair, Rainer Feistel. The agenda (Attachment A) was adopted.

2. Allan Harvey was appointed Clerk of Minutes for SCSW.

3. (included as item #3 in the TPWS Minutes)

4. (thermal conductivity) (included as item #5 in the TPWS Minutes)

5. (0.1 MPa liquid properties) (included as item #6 in the TPWS Minutes)

6. (humid gases) (included in IRS Minutes)

7. (seawater for industrial use) (included as item #9 in TPWS Minutes)

8.1. R. Feistel reported on the implementation into software libraries of the TEOS-10 standard formulations, which has been officially recommended for marine science by the International Union of Geodesy and Geophysics (IUGG) in 2011. Next steps in library development were described, although progress has been slowed by loss of key personnel. Details on the libraries are available at www.TEOS-10.org.

8.2. R. Feistel reported on recent measurements of density and sound speed in the group of F. Millero for seawater to moderately high temperatures at atmospheric pressure. J. Safarov reported on recent measurements, not yet published, of seawater densities over a wide range of temperature (to 195 °C), pressure (to 140 MPa) and salinity (to 55 g/kg). These data will all be useful for possible extension of the seawater thermodynamic formulation to higher temperatures as desired for some industrial applications.

8.3. S. Seitz and P. Spitzer reported on an ocean metrology project through the EMRP (European Metrology Research Programme). Areas of interest to IAPWS include traceability of practical salinity to density, getting data for sound speed over a wider range, metrology of dissolved oxygen, and standards for the pH of seawater and trace composition measurements.