

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Gaithersburg, MD, April 1, 2015**

Attendance:

Peter Murphy, Alstom Power (Vice-Chair, Presiding)
Dan Friend, NIST (U.S. IAPWS Delegate)
Keith Fruzzetti, EPRI
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Anneke Levelt Sengers, NIST
Chuck Marks, Dominion Engineering
Jan Sengers, University of Maryland
Anurag Singh, General Electric
Michael Tinkleman, ASME

[NOTE: Items numbered as on Preliminary Agenda, which is attached.]

1-2. Approval of Agenda and Review of Action Items

In the absence of Chair Richard Harwood, Vice-Chair Peter Murphy presided. After brief introductions, a preliminary agenda was distributed and approved, with the provision that the order of the items could be different. Minutes of the Fall 2014 meeting had been approved by email. Progress on action items was briefly reviewed. Pending **Action** items (some of which are left over from the previous Minutes) are mentioned under related agenda items below.

3. ASME Steam Tables Books

The Third Edition of the book became available for sale in mid-2014. Total sales of the Third Edition so far are 89 copies. The Third Edition has recently become available in the ASME Digital Library.

The Compact Steam Tables booklet has sold over 11,500 copies, with approximately 1700 in the past 12 months; this is a somewhat increased rate compared to the previous few years.

4. ASME Software for IAPWS-IF97

6 copies of the “Professional” version were sold in the past year. One customer has reported some convergence issues in certain routines that should be examined further.

Action: Harvey look into this issue in the Fortran, interfacing with Singh for possible fixing.

For the new DLL software, Anurag Singh had added function descriptions and units and created a separate function category; he had also completed a documentation file but it uses a proprietary software for indexing which may be an issue. A set of **Action** items for finalizing the product was defined:

- o Singh send current product to committee by end of April.
- o All: check installation (both clarity of instructions and whether it works) and report back any problems, also listing systems tested on (version of Windows and of Excel).
- o Singh write a “Getting Started” document by May 20.
- o Harvey check references and provide updated list of formulations used for documentation, by May 20.
- o Check that descriptions of functions in the manual and the Add-in are correct: Murphy check A-H and Harvey check I-Z (by end of May).
- o All: test functions and boundaries as their time permits, with testing to be done by June 15.
- o Friend and Harvey check on availability of testing on Windows 8 (and 8.1) at NIST.

- Murphy: Write a note for documentation regarding iterative calculations, backward functions, and possible drift issues associated with cyclic calculations (by May 15).
- Work with ASME Press to include appropriate logos and legal agreement text as part of the product - Singh
- Work with GE and ASME legal to renegotiate the steam prop license for GE - Singh
- Provide examples to be include in the package – Murphy develop a spreadsheet showing calling of all the functions with different sets of independent variables, and Bellows develop an example of calculations on a Mollier chart.
- Singh: produce the next version (which might be final depending on outcome of items above) by June 30.
- Harvey: discuss pricing with ASME Press (see Fall 2014 Minutes) after above items are complete.

It was mentioned that there will need to be support for the product. The initial plan will be for John Gallagher to provide that on a similar arrangement to that for the current software, collecting issues and bugs and bringing in help where needed (recognizing that we would not guarantee any level of technical support on this software). There can also be a “living” FAQ document, which may be kept at ASME and/or on the Subcommittee website.

[**Action:** Singh discuss support arrangement when he discusses other items above with ASME Press.]

5. Web sites

Harvey reported he set up Google Analytics on the IAPWS site but has not yet examined the results in any detail other than to note that the IAPWS site gets roughly 2000 visitors per month. The Closing Statements for expired ICRNs are now available on the IAPWS website.

6. U.S. Implementation of Formulation for General and Scientific Use

Sales of the new Version 3.0 of the NIST software were 29 in FY2014 and 13 in the first 6 months of FY15; this is a slight increase over the pace of the previous version in the prior few years. It may be considered to add IAPWS properties of seawater and/or heavy water to this product in the future.

7. IAPWS Issues

Dan Friend reported that our nomination for IAPWS Honorary Fellow had been selected. A winner has been selected for the IAPWS Helmholtz award.

Three Technical Guidance Documents (all amendments to existing documents) have come recently from IAPWS for consideration. Three Guidelines will be forthcoming soon; the document on the Spline-Based Table Lookup method for fast calculations requires further work for clarity and will probably be circulated for Postal Ballot at some point after the 2015 IAPWS meeting.

[**Action:** Friend send Technical Guidance Documents to Singh, Marks, and Fruzzetti.]

The 2015 IAPWS meeting will be in Stockholm, Sweden, June 28 to July 3, at the Hotel Scandic Ariadne. The 2016 meeting will be in Dresden, Germany, September 11-16.

The program for travel subsidies for early-career workers to attend IAPWS meetings had been on hold due to uncertainty about how it would work in the new ASME system. It was decided that we could put in a request (perhaps combined with our overall IAPWS request) after our Fall meeting.

[**Actions:** Friend and Murphy, produce draft document for circulation, also circulating to Michael Tinkleman at ASME for his comments. All give comments on draft within 1 month.]

Activities of the various IAPWS Working Groups were discussed, as was possible increased participation by other entities in the Power Cycle Chemistry Working Group.

[**Actions:** Friend: send future IAPWS Technical Guidance documents to Water Technology Subcommittee Chair, send the list of current PCC activities to Marks and Fruzzetti, and request input for the annual report of US activities to IAPWS from ASME’s PPEC Committee, the Water Technology Subcommittee, and EPRI (via Fruzzetti).]

8. Old Business

EPRI reports and funding: Our Custodial Account balance is approximately \$71,000. This does not account for the 2015 IAPWS dues (about \$8000) which must still be paid. Our annual report and request to EPRI have been prepared and sent to Norma Johnston at ASME, but she will not send it until ASME figures out how to establish a fund for the dedicated purpose of IAPWS support.

CFD and Metastable water/steam: There is still interest in this topic, and it would be desirable to make an ASME product that implemented the new spline-based method that will likely be adopted by IAPWS.

[**Action:** Harvey: put this on agenda for next meeting, contingent on the DLL product being complete.]

Thermodynamic derivatives: This would be useful for a 2nd version of our software; as above it will be put on our Fall agenda contingent on completion of the DLL product.

Cooperation with PPEC and US participation in PCC activities: Mostly covered under item 7 above. Keith Fruzzetti is working toward getting the nuclear part of EPRI more involved in IAPWS.

9. New Business

Michael Tinkleman described how the new ASME structure will affect our operations and finances. By-Laws have been replaced by a generic “Guidance Document”. Nobody gets royalties anymore. Spending requests must be approved by the ASME Group Pathways and Support (GPS) group. Our request for payment of IAPWS dues and of travel for the US delegate to the IAPWS meeting is in the system. They still need to figure out a mechanism for a revolving fund that will receive our designated money from EPRI and that can be used to pay annual IAPWS expenses. The preparation of a request for 2016 IAPWS expenses should be on our Agenda for our Fall 2015 meeting.

[**Actions:** Tinkleman send “Guidance Document” for us to review and suggest ways it needs to be adjusted to meet our needs.]

Some of our “long-term” topics were covered above. The current long-term list includes: desalination and seawater; properties for carbon capture and sequestration; properties for concentrating solar power cycles; fast property calculations for CFD; non-Fortran languages (like Java) for our products and apps related to our products; the possibility of having ASME steam-tables calculations on our Subcommittee website; other working fluids such as carbon dioxide for power cycles; needs for distributed power.

10. Membership

It was voted to add Chuck Marks to membership on the Subcommittee.

11. Next Meetings

Possibilities for Fall 2015 include Siemens in Orlando after the IWC (Thursday 11/19), GE in Schenectady (probably in October), or meeting at the same location immediately following the ASME PPEC Committee meeting (northern Virginia in early/mid October). The issue will be decided by email, with the goal of a decision by the end of April.

[**Actions:** Harvey ask Norma Johnston about PPEC co-location possibility; Friend check with PPEC officers. Harwood and Bellows report on feasibility of Orlando 11/19 option. Singh report on GE option.] Our Spring 2016 meeting is scheduled for Wednesday, April 13 (possibly also the morning of April 14) at NIST headquarters in Gaithersburg, MD.

12. Adjournment

The meeting adjourned at approximately 5:30 PM.

Preliminary Agenda: ASME Subcommittee on Properties of Water and Steam

Location: NIST Admin Bldg, Room B-113, Gaithersburg, MD

Time: Wednesday, April 1, 2015, 9:30 to 5:00; Thursday April 2, 8:30-11:00

- 1. Approval of Agenda**
- 2. Review of Action Items from Fall 2014 Minutes**
- 3. ASME Steam Tables book and booklet**
 - 3.1. Report on sales Allan Harvey
 - 3.2. Report on Third Edition and PDF version Rich Harwood, Harvey
- 4. ASME Software for IAPWS-IF97**
 - 4.1. Report on sales Allan Harvey
 - 4.2. Technical support, bugs John Gallagher, Harvey
 - 4.3. Code revision and DLL/Excel product Anurag Singh
- 5. U.S. Subcommittee and IAPWS Web pages** Allan Harvey
- 6. Update on implementation of general/scientific formulation** Allan Harvey
- 7. IAPWS issues**
 - 7.1. IAPWS Awards Dan Friend
 - 7.2. IAPWS documents for consideration Dan Friend
 - 7.3. Proposed travel subsidy program Friend, Peter Murphy
 - 7.4. Preparation for 2015 IAPWS meeting in Stockholm Friend
- 8. Old Business**
 - 8.1. EPRI reports and committee finances Harwood, Friend, Harvey
 - 8.2. CFD and metastable steam issues
 - 8.3. Thermodynamic derivatives
 - 8.4. Cooperation with PPEC Friend
 - 8.5. US participation in IAPWS PCC activities (EPRI, PPEC)
- 9. New Business**
 - 9.1. Effects of ASME reorganization M. Tinkleman, All
 - 9.2. Review of “long-term” items All
- 10. Membership**
- 11. Next Meeting** – November (Thurs 11/19?) in Orlando after IWC? Co-locate with PPEC?
- 12. Adjournment**