

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Gaithersburg, MD, April 13, 2016**

Attendance:

Rich Harwood, Siemens Energy (Chair)
Jim Bellows, James Bellows & Associates (by phone)
Dan Friend, NIST (U.S. IAPWS Delegate)
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Chunzhi He, Thermobook.net
Anneke Levelt Sengers, NIST
Chuck Marks, Dominion Engineering
Jan Sengers, University of Maryland
Anurag Singh, General Electric

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

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

A preliminary agenda was distributed and approved, with the addition of one item that had come up in the main WSTS committee meeting. Minutes of the Fall 2015 meeting had been approved by email. Progress on action items was briefly reviewed. Pending **Action** items 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 172 copies (about 80 sales in the past 12 months).

The Compact Steam Tables booklet has sold over 12,200 copies, with approximately 700 in the past 12 months; this is a somewhat decreased rate compared to the previous few years.

4. ASME Software for IAPWS-IF97

No copies of the old “Professional” version were sold in the past year (632 over lifetime of product).

For the new DLL software, Anurag Singh had made edits to the documentation based on input, and received clarification on some remaining items. There are still some comments on the manual and other leftover items to be addressed. Our **Action** items for finalizing the product are now:

- Singh produce next iteration of the manual and software by April 30 and send to group. This will include the next 4 bullet points below.
- Singh find out from Peter Murphy if issues with functions identified as not working mentioned in Fall 2015 Minutes still exists.
- Singh, rename GAMMA routine to GAMMAUS to avoid conflict with mathematical function of same name available in Excel.
- Singh with advice from Harvey if needed make sure that the Add-In allows user to switch between iterations and backward equations but does not allow tolerances to be changed.
- Singh and Murphy address issue of what is returned when functions are out of range, etc., so that instead of a numeric code Excel will show #NUM. If information like T>Tmin is returned in the cell that is fine, but if we find returns of numeric codes that should be changed.
- All: check installation and test April 30 version, returning any comments or bugs by May 16.

- Singh continue to work with ASME Press to include appropriate logos and legal agreement text as part of the product, and also arrangement where John Gallagher can be paid (by ASME Press) to provide support.
- Continue to work with GE and ASME legal to renegotiate the steam property license for GE (probably as a modification of the 2003 agreement) and also establish that those on the Committee that helped with testing, etc. can get individual copies - Singh
- Singh send Bellows most recent version ASAP to facilitate next item.
- Bellows if time permits (with April 22 deadline) develop an example spreadsheet.
- Singh and Friend establish appropriate permission for use of thermal conductivity code obtained from K. Miyagawa.
- Harvey: discuss pricing with ASME Press (see Fall 2014 Minutes in which we decided to suggest \$200 for the basic Add-in and \$400 with source code included) after above items are complete.

Incorporation of splines for fast calculation (according to the new IAPWS Guideline) and thermodynamic derivatives (according to the IAPWS Advisory Note) for our software in the future are deferred until after this first version of the software is issued. We probably also want to convert to the newer XLL format in the future, which is a job we might want to contract out.

[**Action:** Singh bring to next meeting list of desired/needed enhancements for next version.]

5. Web sites

There was nothing new to report regarding the IAPWS website or that of our Subcommittee.

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

Sales of the new Version 3.0 of the NIST software were approximately 30 in FY15; the number was 8 in the first 6 months of FY16.

7. IAPWS Issues

It was noted that a Helmholtz award will be given in 2016, and that last year's Helmholtz winner who missed the 2015 meeting due to health reasons should be able to attend in 2016.

[**Action:** Friend contact Barry Dooley and Prof. Kretzschmar to see if the 2015 winner could be briefly recognized at the 2016 meeting.]

It was noted that a proposed scheme for numbering IAPWS documents was being circulated, as was a Technical Guidance Document for determining when chemical cleaning was needed for a HRSG.

[**Actions:** Friend send numbering proposal to group, and send TGD to chair of HRSG User Group. Singh identify people in GE who would be interested in commenting on the HRSG document.]

The 2016 IAPWS meeting will be in Dresden, Germany, September 11-16. Information on registration, lodging, etc. is now available via the Meetings section of the IAPWS website.

The possible program for travel subsidies for early-career workers to attend IAPWS meetings is on hold until our finances and procedures for dealing with expenditures with ASME are worked out.

8. Finances and ASME issues

Our Segregated Account balance is approximately \$55,000. 2016 IAPWS dues are apparently in the process of being paid from these funds.

Allan Harvey has submitted requests through ASME's GPS system for funding our IAPWS work (dues and travel expenses for US delegate) and for partial travel funding of Subcommittee Secretary to the Gaithersburg meeting (to offset Conference Services fees). Both have been approved, although the IAPWS request is only being approved one year at a time rather than as a continuing obligation as we had

hoped. Dan Friend reported that, while EPRI could no longer provide funding toward our IAPWS dues, our contact there had indicated that they might be willing to fund travel for the US delegate.

[**Action:** Friend follow up with EPRI contact about travel funding.]

There was further discussion about our relationship with ASME and our place in their new structure (which is apparently under “Energy Conversion and Storage”).

[**Actions:** Harvey obtain Norma Johnston’s presentation to the main WSTS Committee, and find out from Norma whether she is still our ASME staff liaison or if we should begin working with somebody else. If we have a new person, that person should be invited to participate in a meeting of the Main Committee.]

9. Old Business

Regarding our interactions with the PPEC committee, we will continue to share documents with them and try to keep them informed of IAPWS activities, but nothing more concrete has been established.

[**Action:** Friend and Harvey try to arrange a discussion with PPEC leaders in conjunction with the next PPEC meeting in Denver in late September, and report on the interaction at our October meeting.]

10. New Business

Chuck Marks explained the need for some sections of the 1989 *ASME Handbook on Water Technology for Thermal Power Systems* to be updated. The ones of particular relevance to our Subcommittee are Chapter 7 on theory of chemistry in water/steam solutions, and Chapter 8 on available data. It was agreed that producing an entire new Handbook was not a reasonable task to take on. The only viable path is for ASME Press to break the book into individual chapters that can be obtained digitally, and then to work on updating individual chapters. These updates may involve IAPWS people or other experts that we know, but before putting too much effort into identifying authors we need to see if ASME will agree to that approach.

[**Action:** Harvey, Marks, and Harwood create a proposal in the GPS system (with Bellows and Dave Daniels to look at it also) for ASME to agree to this course of action for the Handbook.]

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.

11. Membership

There were no proposals for change in membership. However, Peter Murphy is unable to participate due to his current job situation, so he requested to be removed from his Vice-Chair position. He is also resigning as First Vice-Chair of the main WSTS Committee; Allan Harvey will step into that role.

12. Next Meetings

After discussion on the merits of various options, we tentatively decided to hold our Fall 2016 meeting on Wednesday, October 12 at Dominion Engineering in Reston, VA.

Our Spring 2017 meeting is scheduled for Wednesday, April 19 (possibly also the morning of April 20) at NIST headquarters in Gaithersburg, MD.

[**Actions:** Marks confirm availability of Reston site for October 12 (**NOTE:** this has now been confirmed). Harvey consult with Main Committee officers about possibly eliminating Thursday morning from our Gaithersburg schedule next year.]

13. Adjournment

The meeting adjourned at approximately 5:00 PM.

Preliminary Agenda: ASME Subcommittee on Properties of Water and Steam

Location: NIST Admin Bldg, Room B-111, Gaithersburg, MD

Time: Wednesday, April 13, 2016, 9:30 to 5:00; Thursday April 14, 8:30-11:00 (if needed)

- 1. Approval of Agenda**
- 2. Review of Action Items from Fall 2015 Minutes**
- 3. ASME Steam Tables book and booklet**
 - 3.1. Report on sales Allan 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
 - 4.4. Future incorporation of splines, derivatives?
- 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. Preparation for 2016 IAPWS meeting in Dresden (9/11-16)
 - 7.4. Current IAPWS projects (D₂O [Harvey, Sengers])
 - 7.5. Proposed travel subsidy program Friend, Peter Murphy
- 8. Finances and ASME issues**
 - 8.1. Committee finances Harwood, Friend, Harvey
 - 8.2. New GPS process for our expenses Harvey
- 9. Old Business**
 - 9.1. US participation in IAPWS PCC activities (EPRI, PPEC)
 - 9.2. Interactions with PPEC
- 10. New Business**
 - 10.1. Revision of ASME Handbook Bellows, Marks
 - 10.2. Review of “long-term” items All
- 11. Membership**
- 12. Next Meetings** – Fall 2016 (in conjunction with PPEC in Denver [9/26-28]? Schenectady? With IWC in San Antonio [11/6-10]?)
April 19-20, 2017, NIST Headquarters, Gaithersburg, MD.
- 13. Adjournment**