

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Gaithersburg, MD, April 3, 2019**

Attendance:

Richard Harwood, Siemens Energy (Chair)
Jim Bellows, James Bellows & Associates
Dan Friend, NIST (U.S. IAPWS Delegate)
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Jay Patel, General Electric
Jan Sengers, University of Maryland
Anurag Singh, Bhumio Inc. (by phone)
Richard Pawliger (guest from ASME History and Heritage Committee)

[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. Minutes of the Fall 2018 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 321 copies (about 30 sales in the past 12 months).
The Compact Steam Tables booklet has sold over 13,800 copies, with approximately 500 in the past 12 months.

4. ASME Software for IAPWS-IF97

One copy of the old “Professional” version was sold in the past year (637 over lifetime of product). No new support requests had been received.

For the new DLL software, Jay Patel reported on progress and there was discussion of installation problems, potential problems with thermal conductivity and related properties, and deficiencies in the Help and documentation. There is still testing needed, and also work on the manual. We have the following **Action** items for moving forward:

- Patel send Harvey Word document with existing function documentation (done on 4/5). Harvey go through and fill in gaps and correct unit notation where possible, and send back to Patel for incorporation in a more logical location in the Visual Basic code. (by April 30). Bellows update manual with these corrections (by May 30).
- Harvey verify what previous Fortran did regarding thermal conductivity units, and make sure the current routines are consistent with that (and also that the Prandtl number is computed correctly). (by April 30).
- Bellows cross-check between Add-in and draft manual to be sure all the needed functions are in both places (by April 30).
- Bellows send Patel his Mollier chart spreadsheet for inclusion as an example. Harvey send sample spreadsheet that calls all functions.
- Patel make new install with the post-install scripts inside the install package, so that running the Install as administrator should fully work. Send out new installation by May 5.

- All send Patel bugs, corrections, etc., along with corrections to manual, by June 15.
- Patel: Resolve issues identified in testing by July 15, sending out next iteration if necessary, with goal of sending completed version to ASME Press by September 1.
- Harvey: Check with Camille Cruz to see if she can get copy of 2003 license agreement between ASME and GE. If this is unsuccessful, Harwood look for Siemens version of agreement.
- 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, and also interface with Camille Cruz at ASME (sending her a copy of the Manual for background) regarding what is needed these days to have a product made by a Research Committee.
- Harwood (and potentially others) work out arrangement with ASME Press for their use of the software, preferably with provision that rights are transferred for as long as ASME continues to pay IAPWS dues.

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

Total sales of NIST's Steam 3.0 were 8 in the first half of Fiscal 2019. An update will be made in FY2019 that will fix a few minor items.

6. IAPWS Issues

Dan Friend reported on the nominations for the IAPWS Helmholtz and Honorary Fellow awards. We expressed our approval of both nominees.

[**Action:** Friend convey our approval to IAPWS.]

We suggested that Dan Friend continue to send any IAPWS Technical Guidance Documents that come up in the coming months to Jim Bellows and Chuck Marks from our Subcommittee, to Bob Bartholomew for the Water Technology Subcommittee, to Keith Fruzzetti and Steve Shulder for EPRI, and to the PPEC leadership.

Jan Sengers reported good progress on a new IAPWS formulation for the viscosity of heavy water. It is planned that a complete formulation can be presented at the 2019 IAPWS meeting, at which point testing can begin. The Task Group is starting to look at thermal conductivity, with promising results so far.

The 2019 IAPWS meeting will be in Banff, Alberta, Canada, Sept. 29 to October 4. Information is available via the Meetings section of the IAPWS website, and registration is now open. We were reminded of the Fall 2018 item where GE people in Switzerland expressed the desire for IAPWS to have a recommended formulation that could calculate seawater properties in thermal desalination processes, making some use of some data that are already available that could be used to extend the range of the current formulation (which is primarily for oceanographic conditions).

[**Action:** Friend check with M. Hiegemann if this is still a need, and if so suggest to chairs of IAPWS Working Groups TPWS, IRS, and SCSW that they should consider giving higher priority to this topic.]

We had extensive discussion of our tentative plan to host the IAPWS meeting and ICPWS in the US in 2023. The options would be a standalone conference (with ASME doing conference organization services), or something joint with another ASME conference (like ASME Power). There were too many unanswered questions to make a judgment; we need more information on what ASME would do for us in each scenario, along with considerations of pros and cons of the two approaches.

[**Actions:** Harvey draft a list of questions for which we need answers from ASME and circulate; sending final version to Camille Cruz of ASME. Arrange a conference call (probably in June or July) so that we have a better idea of our direction before the upcoming IAPWS meeting.]

7. Finances and ASME issues

Current financial information was not available.

8. Old Business

In addition to things mentioned under 6.2 above, we discussed that US people in EPRI and PPEC might be more willing to travel to Banff than to IAPWS locations that were overseas.

[**Action:** Friend send information about Banff meeting when opportunity comes to circulate IAPWS Technical Guidance Documents.]

We discussed ways we might celebrate the 100-year anniversary of ASME Steam Tables efforts in 2021. An article in *Mechanical Engineering* would be desirable, and perhaps a session at IMECE or at ASME Power, if one of those meetings welcomes history papers. Other possible magazine locations for at least short items include *Chemical & Engineering News*, *Chemical Engineering Progress*, and *Power*.

[**Actions:** Harvey continue outlining ME magazine article, sending current outline to Bellows if no feedback from previous email received within one week. Harvey check with R. Pawliger about possibility of historical sessions at ASME meetings.]

9. New Business

Richard Pawliger from ASME's History and Heritage Committee discussed the work of that group, particularly its efforts to designate "Historical Mechanical Engineering Landmarks". A relatively new idea is "virtual landmarks" where no physical artifact or location is possible (such as the ASME Boiler and Pressure Vessel Code), and "steam property tables" seems like a good candidate. In further discussion, the committee reached consensus that the real thing to be commemorated was not steam tables as such, but the idea of standardized steam properties, which allow for common ground in international commerce. What is needed from our Committee is endorsement of the project, and then help with the accompanying brochure to explain at a lay level what steam tables are and why they are needed.

The Committee endorsed this idea and expressed willingness to assist with the project, and to bring in international (IAPWS) input to the extent appropriate.

[**Actions:** Pawliger send Harvey and Bellows first draft of ASME nomination for feedback. Assuming it is approved by ASME, we can contribute to writing the booklet, and can give some thought about the appropriate place and time (at an IAPWS meeting?) for a ceremony. Friend get IAPWS buy-in on the concept and see who there might be willing to help.]

Our current list of "long-term" topics includes: desalination and seawater; properties for carbon capture and sequestration; properties for concentrating solar power cycles; data for wet steam from operating turbines; 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, and possible revision of parts of the *ASME Handbook on Water Technology for Thermal Power Systems*.

10. Membership

In view of her 50 years of contributions to US efforts in this area, **the Committee unanimously voted to award Anneke Levelt Sengers the status of "Member Emeritus"**. Some avenues for getting additional industrial involvement were discussed.

[**Actions:** Harvey and Harwood draft letter to Anneke Sengers (to be conveyed via Jan Sengers) expressing appreciation and the awarding of Emeritus status for both this Subcommittee and the "Main Committee" on Water and Steam in Thermal Systems. Patel invite participation of a person of interest in GE. Harwood invite selected Siemens people to join us at our next meeting in Orlando in November.]

11. Next Meetings

For Fall 2019, it was decided to meet in conjunction with the International Water Conference in Orlando, where the main WSTS Committee and the Water Technology Subcommittee will also be meeting. We would meet Thursday, Nov. 14, at the hotel where the IWC is held. For Spring 2020, we will meet at NIST-Gaithersburg on Wednesday, April 29.

[Action: Harvey work through Eric Kangas to get a meeting room arranged for Nov. 14.]

12. Adjournment

The meeting adjourned at approximately 4:30 PM.

Preliminary Agenda: ASME Subcommittee on Properties of Water and Steam

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

Time: Wednesday, April 3, 2019, 9:30 to 5:00 [*“Main Committee” at 8:30 in Lecture Room B*]

- 1. Approval of Agenda**
- 2. Review of Action Items from Fall 2018 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 Jay Patel
 - 4.4. Plan for completing DLL/Excel product Patel, All
- 5. Update on implementation of general/scientific formulation** Allan Harvey
- 6. IAPWS issues**
 - 6.1. IAPWS Awards Dan Friend
 - 6.2. IAPWS documents for consideration Dan Friend
 - 6.3. Progress on heavy water transport properties Jan Sengers
 - 6.4. Preparation for 2019 IAPWS in Banff
 - 6.5. Hosting next ICPWS (2023?)
- 7. Finances and ASME issues**
 - 7.1. Committee finances Harwood, Harvey
- 8. Old Business**
 - 8.1. US participation in IAPWS PCC activities (EPRI, PPEC) Friend, Bellows
 - 8.2. Revision of ASME Handbook Marks, Bellows
 - 8.3. 2021 100-year anniversary of ASME steam tables work Harvey, Bellows
- 9. New Business**
 - 9.1. Steam property tables as ASME Historic Landmark Richard Pawliger
 - 9.2. Review of “long-term” items All
- 10. Membership**
- 11. Next Meetings:** Fall 2019 (IWC [and AIChE] in Orlando week of Nov. 11?); April 29, 2020 in Gaithersburg
- 12. Adjournment**