

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Gaithersburg, MD, April 18-19, 2007**

Attendance:

Mikhail Anisimov, University of Maryland
Jim Bellows, Siemens Power Generation (Chair)
Dan Friend, NIST (U.S. IAPWS Delegate)
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Rich Harwood, Siemens Power Generation
Anneke Levelt Sengers, NIST
Serguei Lvov, Penn State University
Bill Parry, General Electric
Jan Sengers, University of Maryland

[NOTE: Items numbered as on Preliminary Agenda, which is attached. Numbering reflects order on agenda, not order in which items were actually discussed.]

1-3. Approval of Agenda and Previous Minutes

A preliminary agenda (attached) was distributed and approved with the provision that the order of considering items would be changed. Minutes of the Fall 2006 meeting were approved and progress on action items was briefly reviewed. A new policy was adopted for approval of minutes whereby draft minutes would be circulated by email and approved by those present soon after the meeting.

4. ASME Steam Tables Book

Total sales of the book as of 3/31/07 are 1138, reflecting 138 books sold in the last 12 months. Annual sales have been “flat” for several years. There are 159 books left in the current printing.

The new Compact Steam Tables booklet has sold 1173 copies (many in bulk orders) in approximately 6 months so far.

Timing for a Second Edition was discussed in light of IAPWS work in progress that would affect the viscosity, thermal conductivity, and Region 5. Because of the likelihood of a long wait for the thermal conductivity, it was decided that a Second Edition should not wait for that. It is anticipated that the new Region 5 will be approved at the 2007 IAPWS meeting. If the new viscosity is also approved in 2007, then a Second Edition will go forward with those changes (and a note somewhere telling people they can check the IAPWS website for thermal conductivity when that is done). If viscosity is delayed until 2008, the situation will be reassessed based on the supply of the current printing and whether on-demand printing of a few more books is available.

[Actions: Harvey to contact Mary Grace at ASME Press about printing options and lead time for Second Edition. Gallagher to begin preparations for making new charts of viscosity, kinematic viscosity, and Prandtl number.]

[Update: ASME says they can now do “on demand” printing of a small number of copies, which increases our options.]

5. ASME Software for IAPWS-IF97

Total sales are 527 “Professional” version, reflecting 16 Professional in the past 12 months, a nearly constant rate over the past few years.

Current Version 1.1 has had a few minor bugs show up, but nothing major and nothing since our last meeting.

[**Actions:** (left over from last time) Harvey and Parry to look at tightening convergence tolerances on H and S for a future version.]

Bill Parry reported substantial progress on the DLL, which now has some added functions that can be called if the region is not known and has the functions in the Excel Function Wizard. Steps still needed include further testing (especially functions that are not commonly used), documentation, and installation. It was decided that the DLL would be in a combined product with the Fortran, so there would still be just one “Professional” version. Issues of other platforms and languages are deferred until the DLL is done.

[**Actions:** All do as much testing as possible, reporting significant problems needing attention to Bill Parry copied to Karen Tyler. Harwood to test in comparison with IAPWS-IF97 DLL developed in Germany. Parry to check with Mary Grace Stefanchik at ASME Press about whether they can do installation packages. If that is unfruitful, Harvey and Friend to check about using NIST resources to prepare an installation.]

6. Web sites

There was little new to report on this item, other than promotion of the upcoming IAPWS meeting and of the Symposium discussed below (item 10).

7. U.S. Implementation of New Formulation for General and Scientific Use

Allan Harvey reported that sales of Version 2.2 in the first half of Fiscal 2007 had been 25 (11 with source code), with sales roughly constant for several years. At some point in the next year or so, a minor update will be needed for a new IAPWS viscosity standard and perhaps new melting and sublimation curves. In the medium term (perhaps coinciding with the new thermal conductivity formulation in a few years), things will be switched over to the interface used for NIST’s Refprop software, since the old existing interface cannot be maintained or upgraded.

8. Transport Properties

Jan Sengers and Dan Friend reported on the continuing work on the new viscosity formulation being led by Marcia Huber at NIST. There is still interaction going on with the Evaluation Task Group, and it is unclear whether things will get done in time for adoption at the 2007 IAPWS meeting (since it must be sent out to National Committees by late May). There was some discussion of how to make things go more smoothly on the thermal conductivity project. Jan Sengers reported that the revisions of D₂O transport properties for the temperature scale are almost complete.

[**Actions:** Friend to send polite email to the Chair of Evaluation Task Group inquiring about the schedule. Sengers and Friend to look into whether the statement in the Release about use of IAPWS-IF97 with the formulation has really been verified. Sengers and Friend to suggest on behalf of the Transport Properties Task Group at Lucerne that an Evaluation Task Group for thermal conductivity be appointed already in order to advise on early aspects of the process such as data selection. Harvey to send Fortran code for new viscosity formulation to Bellows and Parry.]

9. Ionization Constant of Water

Serguei Lvov reported on the progress of the proposed IAPWS Release on this property, which has now passed the Evaluation stage. There was extensive discussion about the current IAPWS policy that documents should not have named authors, and the desire to give people credit for the work they have done and perhaps to give more contact information. On the issue of contact, there was consensus that mentioning the responsible Working Group would be a good idea. On the issue of credit, it was suggested that perhaps a small Acknowledgments section could appear at the end of documents.

[**Actions:** Friend to ask that the issue of acknowledging individuals in IAPWS documents be put on the EC agenda in Lucerne. Lvov and Harvey to draft proposed language for such a section for the ionization constant release.]

10. Joint IAPWS/ECS Symposium

Serguei Lvov reported on the planning for the Symposium on “Interfacial Electrochemistry and Chemistry in High Temperature Media” at the meeting of the Electrochemical Society (ECS) October 7-12, 2007, in Washington, DC. This session is being cosponsored by IAPWS and by our Subcommittee. It was moved and seconded that we reaffirm our previous decision (see item 11 in Spring 2006 minutes) to provide \$2000 from our custodial funds for expenses of invited speakers for Symposium B4. *The motion passed by consensus.*

[**Actions:** Lvov to provide Bellows with information about payment. Bellows to arrange payment through Norma Johnston at ASME. Harvey to arrange a link to Symposium information on our Subcommittee webpage.]

11. IAPWS Issues

Dan Friend reported that a nomination for the IAPWS Helmholtz award was moving forward, and no action was needed on our part. The U.S. has not yet been asked to vote on any nomination for IAPWS Honorary Fellow *It was agreed that Dan Friend as U.S. National Representative be authorized to vote on behalf of our Committee should such a nomination be received.*

After some discussion, a nominee for the Gibbs award to be proposed by the U.S. committee was agreed upon, subject to the provision that we could change our mind in the next 2 weeks if an obviously outstanding alternative came to mind.

[**Actions:** Levelt Sengers to provide nomination text (5-line summary as requested by IAPWS) before the May 31 deadline, with input if needed from Anisimov. Friend to officially submit nomination.]

So far two proposed documents (a revision to IAPWS-IF97 for Region 5, and Advisory Note 3 on calculating thermodynamic derivatives) have been circulated to National Committees. No objection was noted to either of these (**NOTE:** they can be viewed at <http://www.iapws.org/drafts/>). *Dan Friend as U.S. National Representative was authorized to deal with other documents that might be forthcoming.* It was noted that a new category of document was coming from the PCC Working Group, which might need a new name such as “IAPWS Reviews” or “Technical Guidance Document.”

Concern was expressed about the expense of the Lucerne meeting.

[**Action:** Friend to convey to IAPWS Executive Secretary our concern that meeting and hotel expenses could make it difficult for people to attend.]

Updates were given of plans for various Working Groups in Lucerne.

[**Action:** Bellows to circulate agenda for Power Cycle Chemistry Working Group (when available) to ASME’s PPEC Committee and Water Technology Subcommittee.]

The 2008 ICPWS in Berlin was discussed. It was the desire of the Subcommittee to provide some financial support for students and postdocs from U.S. institutions to attend. It was moved and seconded that 4 \$800 scholarships be allocated from our custodial fund for this purpose, on the same terms as we did for the Kyoto meeting. *The motion passed by consensus.* **NOTE:** The Kyoto terms were as follows (from Fall 2003 minutes): “Dan Friend and Jim Bellows were authorized to commit the money on behalf of the Subcommittee “in response to letters requesting financial support and for encouragement of selected graduate student coauthors.”

[**Action:** Harvey to inform Berlin organizing committee of availability of scholarships.]

12. Membership

Richard Harwood of Siemens Power Generation was unanimously approved for membership in the Subcommittee. It was decided to drop several people from our official membership list who have not been active in several years. It was communicated that ASME's Center for Research and Technology Development wanted a current copy of our membership list.

[**Action:** Harvey to send updated list to Norma at ASME.]

13. Old Business

The status of item 13.1 was unknown.

[**Action:** Bellows to check with Norma Johnston at ASME about our book order, which was authorized as recorded in our Fall 2005 minutes. Bellows to write cover letters to go with books. Parry to provide contact address for who the book should go to at GE.]

14. New Business

Discussion of a 5-year plan was deferred. Jim Bellows distributed several leftover copies of the Orlando ICPWS Proceedings, to be donated to libraries and other good causes.

15. Next Meetings

Our Fall 2007 meeting will be at the Siemens facility in Orlando immediately after the International Water Conference, for 1.5 days most likely starting either the afternoon of Wednesday October 24 or the morning of Thursday October 25. We will plan to have a Symposium with both Committee members and Siemens people presenting, much as we had in Schenectady in Fall 2006.

Possible Symposium speakers include: Bellows (cycle chemistry); Harvey (history of steam tables); Parry (turbine design); a Siemens speaker on plant testing; Lvov (fuel cells?); a speaker on direct-fired turbines.

In Spring 2008, we will meet at NIST-Gaithersburg on Wednesday and Thursday (just the morning on Thursday), April 16-17.

There was some discussion of possible Fall 2008 meeting locations. Possibilities include the site of the IWC (which will probably be Las Vegas), the facility of Alstom Power in Connecticut, or perhaps in conjunction with a meeting that featured aqueous physical chemistry.

[**Actions:** Bellows to organize facilities and meeting timing and speakers for Orlando meeting. Bellows to contact Frank Gabrielli about possibility of a future meeting at Alstom. Lvov to consider possibilities for a future meeting that would be convenient for aqueous physical chemists.]

Respectfully submitted,
Allan Harvey, Subcommittee Secretary

Agenda: ASME Subcommittee on Properties of Water and Steam

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

Time: Wednesday, April 18, 2007, 10 AM to 5 PM, Thurs. April 19, 8:30 to Noon

- 1. Approval of Agenda**
- 2. Approval of Minutes from Fall 2006 meeting**
- 3. Review of Action Items from Fall 2006 Minutes**
- 4. ASME Steam Tables book and booklet**
 - 4.1. Report on sales Allan Harvey
 - 4.2. Future plans Harvey, All
- 5. ASME Software for IAPWS-IF97**
 - 5.1. Report on sales Allan Harvey
 - 5.2. Technical support, bugs John Gallagher, Allan Harvey
 - 5.3. DLL/Excel product Bill Parry
 - 5.4. Other platforms and languages All
 - 5.5. Plans for new backward equations Allan Harvey, Bill Parry
 - 5.6. Testing of future versions Bellows, Harvey, Parry
- 6. U.S. Subcommittee and IAPWS Web pages** Allan Harvey
- 7. Update on implementation of general/scientific formulation** Allan Harvey
- 8. Report on transport properties** Dan Friend, Jan Sengers
- 9. Report on K_w and planned IAPWS release** Serguei Lvov
- 10. Report on upcoming IAPWS/ECS Symposium** Serguei Lvov
- 11. IAPWS issues**
 - 11.1. IAPWS Awards Dan Friend
 - 11.2. IAPWS documents for consideration Dan Friend
 - 11.3. Current WG activities Harvey, Parry, Bellows, Lvov
 - 11.4. Preparation for August IAPWS meeting in Luzern All
- 12. Membership** All
- 13. Old Business**
 - 13.1. Books to sponsors of 2001 meeting Bellows, All
- 14. New Business**
 - 14.1. 5-year plan for committee Bellows, All
 - 14.2. Copies of Proc. 12th ICPWS Bellows, All
- 15. Next Meeting – Time, Place, etc.**
 - 15.1. Program for Orlando meeting Oct. 2007 Bellows, All
- 16. Adjournment**