

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Gaithersburg, MD, April 26-27, 2006**

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)
Dick Jacobsen, University of Idaho – Idaho Falls
Anneke Levelt Sengers, NIST
Serguei Lvov, Penn State University
Bill Parry, General Electric
Jan Sengers, University of Maryland
Michael Tinkleman, ASME Staff

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

1 & 2. Approval of Agenda and Previous Minutes

A preliminary agenda (attached) was distributed and approved with a couple of additions and the provision that the order of considering items would be changed. Minutes of the Fall 2005 meeting were approved.

3. Review of Action Items

Action items from the last meeting were reviewed, those not yet done are for the most part discussed later in these minutes while outstanding items not covered elsewhere follow.

[Actions: Bellows to transmit ASAP overdue EPRI report and funding requests to Norma Johnston at ASME, and communicate with Barry Dooley regarding lateness of our request. Parry to allow extrapolation in metastable region to 8% moisture (instead of 5%) with accompanying warning. Bellows to get a copy of the new ASME document “Consensus on Operating Practices for the Sampling and Monitoring of Feedwater and Boiler Water Chemistry in Modern Industrial Boilers” (once it is printed; it was approved 10/05) to the IAPWS PCC task group working on related issues.]

4. ASME Steam Tables Book

Total sales as of 4/14/06 are 1000, reflecting 130 books sold in the last year. No new Errata have been found in the last year. Annual sales have been “flat” for several years. The third corrected printing was issued by ASME Press in early 2006.

It was discussed that a Second Edition would be appropriate when new IAPWS formulations were adopted for viscosity and thermal conductivity, which in the latter case is at least 2 years away.

5. ASME Steam Tables Software

Total sales are 511 “Professional” version, reflecting 17 Professional in the past year, a slight decline. Current Version 1.1 has had a few minor bugs show up, but nothing major. John Gallagher has been working with somebody from Foster-Wheeler making extensive use of the software.

[**Actions:** Gallagher to send this person's contact information to Bellows for invitation to meeting. Harvey and Parry to look at tightening convergence tolerances on H and S for next version.]

Bill Parry presented an "alpha" version of a DLL and Excel add-in for the steam properties. The implementation allows the source code to be identical for this and the regular product. Much testing and refining still needs to be done, including error handling and documentation. CDs were handed out with a version to be used for testing, with the goal of having this round of testing done by July 1.

[**Actions:** All do as much testing as possible, distributing a small number of copies as needed in order to facilitate more testing in their organizations. Friend and Harvey to get student help at NIST to check the documentation. Bellows and Jacobsen to get student help in testing. Parry to add simple functions like VPT and SPT if easily feasible. Parry and Harvey to check with Mary Grace Stefanchik at ASME about packaging and pricing of this add-in.]

6. Steam Tables Booklet for ASME Press

Allan Harvey and Jim Bellows reported on their discussions with ASME Press about producing a small booklet of steam tables along the lines of the old Combustion Engineering booklet. There is apparently demand for about 5000 copies a year. There was discussion about details, with the following results: (1) The "units" section in the booklet should be the relevant unit conversion tables from the big steam tables book. (2) The Mollier chart from the book (perhaps enlarged) should be sufficient for purposes of this booklet. (3) Some expansion of the SI units section was endorsed. (4) Consideration should be given to producing camera-ready copy. (5) Consideration should be given to the size; it should fit in a jacket pocket and the current version may be a bit too large. (6) It might be useful to have a way for companies to order large quantities with their logo on the cover.

With regard to the schedule for moving forward on the booklet, it was decided that this project should be a low priority until a satisfactory approach to revenue sharing for such products is worked out.

[**Actions:** Harvey and Bellows to move forward on constructing booklet at low priority. Harvey to communicate our decisions to ASME Press.]

7. Web sites

There is now a place on NIST's web space (accessible from both our Subcommittee web page and the IAPWS site) with NIST's printed Steam Tables report, NIST-IR 5078.

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

Allan Harvey reported that sales of Version 2.2 in the past 6 months had been 26 (18 with source code), with sales roughly constant for several years. At some point in another year or so, an update for a new IAPWS viscosity standard will be needed, followed by thermal conductivity. It remains to be seen what will be done with regard to a new IAPWS ice release, and perhaps also a new formulation for the ion product of water.

9. Transport Properties

Dan Friend and Jan Sengers reported that some complications had arisen in the viscosity formulation, forcing some adjustments which have just been finalized. The revised formulation is being sent out to the Evaluation Task Group. This had fallen considerably behind the schedule set for the release process; adoption at the 2006 IAPWS meeting may not be feasible at this point. For the thermal conductivity, Ms. Metaxa from Greece is currently working in Boulder for two weeks (supported by funds from our custodial account) to develop the early phases of that project, but it will likely be 2008 at the earliest before a new release for thermal conductivity can be adopted.

10. Self-Ionization of Water

Serguei Lvov discussed his work on modeling and correlating the self-ionization constant of water over a wide temperature and density range. A draft IAPWS Release has been prepared to be circulated to the TPWS and PCAS Working Groups before the next meeting. There was some discussion on improvement of the document and on the schedule for moving forward.

[**Action:** Lvov to see that revised draft Release circulated to TPWS and PCAS prior to 2006 IAPWS meeting.]

There was also some discussion of the role of acknowledgments to individual workers and/or Working Groups on IAPWS documents. The Committee took no position on the issue.

11. IAPWS Issues

The 2006 IAPWS annual meeting will be September 3-8 in Witney (near Oxford), England. More information is available under the "Meetings" section of www.iapws.org. It should be noted that registration for this meeting is requested by the end of May.

The U.S. delegate reported that he voted to approve the proposed nomination for IAPWS fellow. The nomination procedure for the Helmholtz award was discussed.

[**Action:** Friend to propose to IAPWS that rules for Helmholtz award be changed to allow anybody to submit a nomination (other than self-nominations).]

The proposed IAPWS Release on thermodynamic properties of ice was considered, and no objections were raised.

Brief reports were given about current activities of the various IAPWS working groups.

Serguei Lvov presented the proposal for a symposium on "Interfacial Chemistry and Electrochemistry in High-Temperature Fluids" to be held at the October 2007 meeting of the Electrochemical Society. The ECS and IAPWS are already sponsors; our committee was asked to add its support.

It was moved and seconded that up to \$2000 from our custodial account be allocated to support speaker expenses for this Symposium. The motion was passed by consensus.

12. Membership

Nothing specific under this item, but see under (15) below for our next meeting which it is hoped will attract interest from GE.

13. Old Business

Our effort to get copies of the IAPWS monograph to GE and Siemens in appreciation of their past financial support of the Committee (see Fall 2005 minutes) has only been partially completed.

[**Actions:** Harvey to work with Norma at ASME to order one book. Bellows to write cover letters to go with books. Parry to provide contact address for who the book should go to at GE.]

Jim Bellows reported that adoption of IAPWS-IF97 in ASME's Power Test Code is going smoothly.

There was extensive discussion of our position regarding the revenue-sharing discussions ongoing in ASME, in the hope that the current situation where Research and Technology Committees (and CRTD) get nothing from the books and software they produce.

It was moved and seconded that the Subcommittee express the following position: We believe that there must be revenue sharing based on a percentage of the total revenue from products of committees like ours, to support ongoing and future research development. We suggest that this should be 20% of the revenue, split 80/20 between the originating Committee and CRTD. The motion was passed by consensus.

14. New Business

For the longer term, there is still a desire to work on a “5-year plan” for the Subcommittee.

[**Action:** Bellows and Harvey to put 5-year plan on agenda for next meeting.]

The research project on amine use sponsored by our parent committee (ASME Research & Technology Committee on Water and Steam in Thermal Systems) was discussed. It was agreed that this was a worthy project and might attract interest from IAPWS.

It was moved and seconded that the Subcommittee contribute \$5000 from its custodial account to the amine research project. The motion was passed by consensus.

[**Action:** Bellows to communicate with IAPWS Power Cycle Chemistry Working Group about this project and promote possible international collaboration.]

15. Next Meetings

In Fall 2006, we will meet at the GE facility in Schenectady, NY. Some conflicts forced a rescheduling from what we had previously said; now this meeting will be on Thursday and Friday, Nov. 2-3 (probably just the morning on Friday).

In Spring 2007, we will meet at NIST-Gaithersburg on Wednesday and Thursday (probably just the morning on Thursday), April 18-19.

For the Fall 2006 meeting in Schenectady, it was planned to have a mini-symposium for interaction between GE people and our Subcommittee. The following topics were suggested for talks of about 20 minutes each:

- 1) A GE person to talk about industrial needs
- 2) Allan Harvey to talk about standard thermodynamic properties for water and steam
- 3) Jan Sengers to talk about standard transport properties for water and steam
- 4) Mikhail Anisimov to talk about nucleation
- 5) Jim Bellows to talk about “chemistry on the Mollier chart”
- 6) Serguei Lvov to talk about fuel cells

[**Actions:** Parry to confirm dates for meeting, recruit GE attendance, and arrange mini-Symposium.]

Respectfully submitted,
Allan Harvey, Subcommittee Secretary

Preliminary Agenda: ASME Subcommittee on Properties of Water and Steam

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

Time: Wednesday, April 26, 2006, 10 AM to 5 PM, Thurs. April 27, 8:30 to Noon

- 1. Approval of Agenda**
- 2. Approval of Minutes from Fall 2005 meeting**
- 3. Review of Action Items from Fall 2005 Minutes**
- 4. ASME Steam Tables book**
 - 4.1. Report on sales Allan Harvey
 - 4.2. Third corrected printing Allan Harvey
 - 4.3. Future plans Harvey, All
- 5. ASME Software for IAPWS-IF97**
 - 5.1. Report on sales Allan Harvey
 - 5.2. Technical support, bugs
Harvey John Gallagher, Allan
 - 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. Steam Tables Booklet for ASME** **Jim Bellows, Allan Harvey**
- 7. U.S. Subcommittee and IAPWS Web pages** **Allan Harvey**
- 8. Update on implementation of general/scientific formulation** **Allan Harvey**
- 9. Report on transport properties** **Dan Friend, Jan Sengers**
- 10. Report on Kw and planned IAPWS release** **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. Preview of Sept. 2006 meeting in England All
 - 11.5. 2007 interface/electrochem cosponsored meeting Serguei Lvov
- 12. Membership** **All**
- 13. Old Business**
 - 13.1. Books and proceedings to sponsors of 2001 meeting Bellows, All
 - 13.2. IAPWS/ASME property standards in PTC Bellows
- 14. New Business**
 - 14.1. 5-year plan for committee Bellows, All
 - 14.2. Amine project support Bellows
- 15. Next Meeting – Time, Place, etc.**
 - 15.1. Program for Schenectady meeting Parry, All
- 16. Adjournment**