

◆ G-4 NEWS ◆

Volume 6 Issue 2

The Newsletter for Oxygen Compatibility Practitioners.

Fall 1999

Last Snail-Mail Issue of G-4 News

This is the last issue of G-4News that will be printed and hard-copy mailed by G-4. Beginning with the Spring 2000 issue, official distribution will be by electronic mail only, with copies also posted for downloads from the G-4 Web Site.

Several members will be given the mailing addresses of those who will no longer be receiving mailings so that

they can informally identify anyone without Internet access that they might wish to supply copies through internal corporate E-Mail or with printouts.

Please provide your E-Mail address to our Web Site (address on page 2), or to Steve Mawn, ASTM G-4 ASTM Committee G-4, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 (smawn@astm.org). G4N

Committee Leaders to Repeat Terms

G-4's Officers were elected to serve for another term. John Cronk of Liquid Air Engineering will continue as Chair (his third term). William Royals of Pratt and Whitney will be Vice-Chair. Ronald Epstein of Halocarbon Products Corp will be Secretary.

This term will be for the 2000/2001 session and represent the leadership taking G-4 into the new millenium. G4N

“Oxygen 2000” Symposium Status

Oxygen 2000 has experienced the loss (and gain) of papers, and arrangements and progress are proceeding very well.

A keynote speaker has been confirmed: Coleman J. Bryan, Safety Manager for KSC and a past Chair of ASTM G-4, will present the keynote talk entitled:

“A Review of Test Methods Used in the Selection of Materials for Oxygen Service.”

A dinner is tentatively being planned in the Eiffel Tower with an anticipated talk on the twenty-five-year history of Committee G 4 to be given by Robert E. Lowrie, former G-4 Chair. A suitable memento of the occasion is being planned, and several possibilities are being considered.

There have been both gains and losses. Unfortunately, ten papers among the forty-three original submissions (listed in the Spring 1999 issue of G4 News) have been withdrawn from consid-

(See O₂2000 on page 3)

Progress at Las Cruces:

.....*Busy! Busy! Busy!*

The high dessert of New Mexico was scene of a full week of oxygen compatibility events: a TPT course, a tour of NASA's White Sands test facility, a Metals Combustion Workshop, and G-4's regular meetings. It was busy.

The **Main Committee, G4.00** received the report of the Nominating Committee for the term 2000-2001 and approved it unanimously. Joel Stoltzfus reviewed his survey of fires occurring in oxygen regulators. Four new applicants were approved for membership on the G-4 Committee.

Test Methods G4.01 reviewed the statuses of the PCTFE and regulator fire Task Groups (See articles p. 2). A 20 minute video is being developed for the regulator program. A Task Group was named to revise G124 (Promoted Combustion). Reapproval will be sought for G 125, (the commit-

tee's Oxygen Index test).

Practices G4.02 noted that testing of thick stainless steel is still pending and testing of alloys at high temperatures is about to begin, a new testing program for

(See Progress on page 3)

Inside This Issue

| | |
|--------------------------------|---|
| <i>Last Snail-Mail G4N</i> | 1 |
| <i>Leaders to Repeat Terms</i> | 1 |
| <i>Progress at Las Cruces</i> | 1 |
| <i>Symposium Changes</i> | 1 |
| <i>PCTFE Report</i> | 2 |
| <i>Regulator Test Status</i> | 2 |
| <i>Metals Workshop Success</i> | 2 |

PCTFE Task Group Reports Results

The G-4 task group studying the mechanical behavior and ignition sensitivity of PCTFE plastics met at Las Cruces. Ignition of PCTFE plastics used as valve seats and regulator seats has occurred over the last several years with increasing frequency since the 3M Corporation stopped supplying the most common PCTFE plastic used by oxygen practitioners: Kel-F 81. The G4 task group has documented that a large quantity of the PCTFE stock that is being used in valve seats and regulators has a tendency to deform while in service. It is believed that this tendency to deform while in use may increase the sensitivity of the polymer to ignition.

Testing has been performed on old-stock 3M PCTFE and currently available stock to evaluate whether differ-

ences can be discerned. Presently, neither autogenous ignition testing nor mechanical impact testing found differences in the ignition sensitivity. Thermal mechanical analysis, which measures a material's deformation under load, confirmed that many of the PCTFE valve and regulator seats currently used behave in a mechanically unstable way. The deformation under load for some seats has been extreme.

To understand this behavior, the G4 task group has developed a test matrix to evaluate which material properties (i.e., molecular weight, crystallinity, etc.) and which material processing methods (compression or extrusion molding) best control the mechanical behavior. Testing is expected to be completed by the time of the March 2000 meetings in Toronto. **G4N**

Metals Combustion Workshop is a Success

Following the G-4 Committee meetings on September 16 and 17 in Las Cruces, New Mexico, The Research Subcommittee (G4.92) chaired and jointly hosted with ASTM and NASA White Sands Test Facility, a Second International Metals Combustion Workshop (IMCW-2).

The workshop had excellent attendance with over 40 individuals participating in the presentations and open discussions. Like the first workshop (IMCW-1), IMCW-2 brought together individuals to discuss phenomena associated with the ignition and combustion of metallic materials. IMCW-2 focussed on the ignition phenomena and ignition mechanisms present in systems operating in oxygen and oxygen-enriched atmospheres.

Presentations were made by Matt Hart of NASA WSTF ("Temperature of Iron Burning in Oxygen"), Ted Steinberg of University of Queensland ("Promoted Combustion Testing," "Semenov Ignition Theory"), Elliot Forsyth of Wendell Hull Associates ("Particle Impact Testing in Flowing Oxygen"), Ian Leslie of New Mexico State University ("Flow Analysis of Particle Impact Tester"), Barry Newton of Wendell Hull Associates ("Adiabatic Ignition and Test System"), Michelle Barragan of NASA WSTF ("Effects of Equations of State on Compression of Oxygen"), Mike Shoffstall of NASA WSTF ("Laser Ignition Test System"), Joel Stoltzfus of NASA WSTF ("Frictional Ignition of Metals in Oxygen"), John Porter of Rockwell Science Center ("Extinguishment Methods at Rockwell"), and Bruce Wilson ("Modelling of Metallic Systems"). The presentations were followed with open discussions and a round-table session dedicated to the generation of ideas needing further investigation.

The event was so successful that plans for an IMCW-3 are under consideration. **G4N**

Provisional Regulator Ignition Test To Bow Soon!

The ASTM G4 committee has been requested by the FDA and NIOSH to develop a positive ignition standard to evaluate the ignition sensitivity of medical oxygen regulators. At least 17 fires have been reported in the last five years, including one in recent months. Most fires have involved aluminum-bodied regulators and have led to catastrophic burnout with operator injuries.

The ASTM G4 sub-committee on Test Methods has developed a positive ignition test that will subject regulators to three levels of evaluation to assess their ignition sensitivity: (1) The standard ISO/CGA rapid compression testing will be performed to evaluate the

sensitivity under normal operating conditions, (2) A positive ignition test intended to ignite the regulator's main seat will be performed to evaluate the burnout potential if a seat ignition occurs after having been in service for a period of time, and (3) A positive ignition test intended to ignite the inlet filter so as to evaluate a cylinder valve seat fire and/or an aluminum particle impact event at the filter.

These tests have been designed to evaluate whether a regulator is tolerant of the types of ignition mechanisms that are commonly suspected under service conditions. The standard is in final revision and should be submitted to peer review in the next two or three months. **G4N**

G-4 Web Site

<http://www.wstf.nasa.gov/labs/oxcompat/>

(Progress from page 1)

oils in wet and dry oxygen was shelved for lack of adequate definition and low funding interest, and there are four practices due for five-year revision in 2000 (G 114, G120, G127 and G128).

Long Range Planning G4.04 did not meet because of the crowded schedule.

Education G4.05 reported 30 students attended the On-site TPT course. There were no seminar papers due to the crowded agenda, and a call for seminar presentations at the next meeting in Toronto was issued. NFPA 53 has been revised and is available. The NASA Design Guide edited into an ASTM manual has gotten to the galley proof stage. Harold Beeson and Barry Newton authored a chapter for a book on hyperbaric chambers.

Symposia G4.06 continued its planning for its next symposium (See *Oxygen 2000*...p. 1). Meeting site details and tentative paper commitments were discussed.

Research G4.92 obtained ASTM G-4 funding for a research program on the limits of flammability of titanium in O₂/N₂ mixes. The work will proceed over the next several months.

Statistics G4.93 reported a searchable CD-ROM containing the full series of G-4 Standard Technical Publications (STPs) is nearing completion, and seeks to have it available in time for next Spring's meeting.

Publicity G4.94 decided on exclusive distribution of *G-4 News* by E-mail beginning with the Spring 2000 issue.

Executive G4.90 approved funding (\$8900) to continue a study of the flammability of titanium metal at the University of Queensland (which consumes the balance remaining in the account from the G-4 Metals Testing Program of the 1980's, supplemented with approximately \$750 from the G-4 General Account), dropped six members from the G-4 Roster for non-payment of dues, and kept this Committee's powder dry.

G4N

(O₂ 2000 from page 1)

eration. These include eight European submissions and two U.S. submissions.

The withdrawn papers are:

"A Model for the Burning of Teflon",

"Thermodynamic Analysis of the Combustion of Metallic Materials)",

"Investigations of Two Major LOX Reboiler Accidents",

"The Ignition of Non-Metallic Materials in High Pressure Flowing Oxygen",

"Hazards Associated with the Filling of Diving Cylinders with Nitrox",

"Studies on Cleaning Agents and Processes for Oxygen Service Systems",

"Flammability of Endotracheal Tubes",

"The Variation of Spontaneous Ignition Temperature of Volatiles from Non-Metallic Materials with Pressure in Pure Oxygen Atmospheres",

"Factors Affecting the Measured Ig-

nition Temperature of Volatiles from Non-Metallic Materials in Oxygen-Enriched Atmospheres",

"The Evolution of Safe Practices for Centrifugal Liquid Oxygen Pumps Used in Air Separation Plants",

However, one new paper has also been accepted:

"Evaluation of The Ignition Susceptibility of Plastics In Nitrogen Trifluoride (NF₃) by Autogenous Ignition Testing and Flow Induced Heating."

The impact of these changes on the scheduling and duration of the symposium are not certain yet. Indeed, there may be more losses as the peer-review and revision deadlines pass. This may lead to a shortened symposium. However, it may also enable additional presentations to be added (but they could not be included in the next STP for which peer review is well underway). Final details will be ironed out at the Spring 2000 G-4 meeting in Toronto and chronicled in the next issue of this newsletter.

The best news is saved for last. So far, the Special Technical Presentation (STP) is on schedule and is expected to be available for distribution on the first day of the symposium. Stay tuned.

G4N



I want G-4 News!

Your name will be listed in our publicly available database of oxygen compatibility enthusiasts, please check *all* boxes that apply to you.

New Request

Correction

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G-4 Member

G-4 Symposium

G-4 TPT Course Student

Consultant

Commercial Testing Source

General Interest in Subject

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G-4 NEWS



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Non-Profit Org.

Inside This Issue:

- *Last Snail Mail Issue*
- *Progress at Las Cruces*
- *Leaders Reelected*
- *“Oxygen 2000” Changes*
- *PCTFE Status*
- *Regulator Test to Bow*
- *Metals Workshop Succeeds*

G-4 Events and Housekeeping

Regular meetings of the Committee G-4 have been scheduled as follows:

- Mar 15-16, 2000Toronto, Canada
- Sept 25-26, 2000.....Paris
- Mar 28-29, 2001.....Phoenix, AZ
- Sept 19-20, 2001.....Panama City, FL
- Mar 13-14, 2002.....Pittsburg, PA

Contact Steve Mawn (610) 832-9726 for details or membership data. ASTM Membership is \$65 per year.

The next G-4 Symposium is:

- Sept 27-29, 2000Paris

For a Call for Papers or Program, call Steve Mawn (610) 832-9726.

Public offerings of the course: *Controlling Fire Hazards in Oxygen Handling Systems* are planned for:

- Mar 13-14, 2000.....Toronto, CA
- Sept 25-26, 2000.....Paris
- Mar 26-27, 2001.....Pheonix, AZ
- Sept 17-18, 2001.....Panama City, FL

Cost is \$675.00 (including text). It can be offered at your site for a negotiated price. The course text: *Fire Hazards in Oxygen Systems* may be ordered separately for \$250 (2 volumes). Sessions of the "Operation and Maintenance" course are also being scheduled. Call Scott Murphy (610) 832-9685 for information/ brochure for either course.

A 210-page compilation of 23 1997 ASTM Standards on oxygen safety is available, Stock #FIRHAZ, \$68 in the USA, \$75 elsewhere, (610) 832-9585.

The G-4 Videotape *Oxygen Safety* PCN 12-700880-31 may be ordered from ASTM Customer Service at (610) 832-9585. Price \$75 (\$67 for members).

All G-4 standards appear in part 14.02 of the Book of Standards or may be ordered individually from ASTM Customer Service (610) 832-9585. Typical standard prices range \$15-30.

Details:

This newsletter is a product of ASTM Committee G-4. The editorial staff is the G-4 Committee Officers and ASTM Staff:

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