Safety & Health News

AIChE
AMERICAN INSTITUTE OF HEMICAL ENGINEERS

SAFETY AND HEALTH DIVISION
www.shdiv.aiche.org

SPRING 2008

MEASURING PROCESS SAFETY

Dennis C. Hendershot

There is an often quoted saying, “You can’t manage what you can’t (don’t) measure.” The origin of this saying is somewhat obscure – it has been attributed to management consultant and author Peter Drucker, software engineering author and teacher Tom DeMarco, and others. There is a lot of truth in this idea, although W. Edwards Deming has also pointed out the need to manage things that cannot be measured. But, it is more difficult to manage things that are not measured. How do you set goals and measure progress toward those goals? How do you compare this year’s performance to last year’s? How can you compare the performance of one part of a company – a plant, a business, a group of businesses, for example – to another?

In particular, how do we measure process safety performance? We have tools for measuring overall safety performance – OSHA recordable rates, lost time injuries, days away from work, and other injury measures. These measures combine injuries from all causes into a single safety measure, and do not distinguish between process safety injuries – those arising from the hazardous properties of the materials and the manufacturing processes – and other injuries caused by general workplace hazards – slips, trips, falls, “struck by” type injuries. The report of the BP North American Refineries Independent Safety Panel (the “Baker Panel”, of which I was a member), issued in January 2007, pointed out that these measures of overall safety can be misleading with regard to process safety performance. Good workplace safety does not ensure good process safety. Both are important, but the activities required to manage process safety are not the same as those required to manage general workplace safety. When you think about it, this makes sense. As an analogy, in the air transportation system, a significant contributor to injuries is handling of baggage. But no airline would make the mistake of believing that the activities required to prevent this type of injury would have any impact on flight safety. There is some relationship in terms of overall attitude and culture, but the safety management activities are different, and good performance in one area does not ensure good performance in the other.

To date, we have not had a good set of tools for measuring process safety performance. Industry and the chemical engineering profession have recognized this problem, and there have been a number of efforts to develop appropriate measures over recent years. A recent and promising development is the publication of a new CCPS document, *Process Safety Leading and Lagging Metrics*, which can be downloaded from the CCPS web site[1].

[1] http://www.aiche.org/ccps/metrics/index.aspx

The CCPS publication offers suggestions for both leading and lagging metrics for process safety. Lagging indicators will tell us where we are, where we have been, how different parts of the organization are performing relative to each other. They measure actual outcomes of interest – fires, explosions, process related injuries, leaks, releases, near misses, for example. They tell us how the process safety systems are actually performing – how well they are meeting their objective of preventing the release of hazardous material or energy. Management can set goals for improvement, and the lagging indicators will be useful in determining where resources should be directed to most effectively meet those goals.

Leading indicators will usually measure activities which we carry out in order to manage process safety. We believe that process safety performance will improve if we do these activities well. Some potential leading indicators might include things like the percentage of required process hazard analyses (PHAs) completed within the required time frame, the percentage of safety related action items from all sources (PHAs, incident investigations, management of change reviews, etc.) completed within the specified completion time, the percentage of inspections and tests of safety critical instruments and equipment completed within the required time period, or the fraction of required mechanical integrity inspections and tests of process equipment completed within the scheduled time period.

The new CCPS publication offers a good basis for establishing process safety metrics for a company. You should review this document and consider adapting some of its suggested metrics for use in your organization. These measures have the potential for helping management understand where the company stands in process safety management, to establish future goals, and to measure progress toward those goals.

SAFETY & HEALTH DIVISION UPDATE

Bob Johnson, Chair

With this issue, the compiling of our Division's newsletter is taking a step towards passing from one very capable and dedicated person to two other very capable and dedicated persons.

A. Sumner (Sam) West has been our Division's newsletter editor for many years, and has done a fantastic job over those years of keeping us informed with timely and interesting *Safety & Health News.* Sam now holds the esteemed title of Editor Emeritus and will continue to help out as he is able. Please send Sam a note or email (3896 Sidney Road, Huntington Valley, PA 19006, aswest@worldnet.att.net) or give him a call (215-938-7181) to express your appreciation for his great work on behalf of the Division.

Our newsletter's co-editors are now Dennis Hendershot and John Murphy, who have given Division activities excellent leadership in many other areas, as I'm sure you are aware. Dennis and John are our two most recent recipients of the Division's Walter-Miller Award, our most prestigious award for outstanding contributions to the Safety and Health profession within chemical engineering. So it is our great privilege for them to carry forward our key means of communication within the Division.

As to the current state of the Safety & Health Division, we are one of the largest Divisions within AIChE, and now have 1,175 members in 36 countries. That's really something to think about! You are a member of a safety engineering professional community that extends into nearly every state and province and across the globe. Hundreds of our Division members hold safety leadership positions within their companies, and many are in senior management positions. I'd like you to be thinking of ways we can use the depth and breadth of this community to make major strides together in the coming years in the process safety, industrial safety, health and hygiene fields, building on our common interest in chemical engineering. Take time to send me a note at rjohnson@unwin-co.com, and I will compile and report your ideas at our Division's Executive Committee meeting in New Orleans.

Our Division's major activities for this year, as in previous years, are the superb opportunities for sharing technical advances and lessons learned, networking and camaraderie with fellow safety professionals at the Global Congress on Process Safety in New Orleans and at the Ammonia Conference in San Antonio.

And, incidentally, our Division is in very good shape financially. The conferences and annual Division dinner pretty much pay for themselves. Our dues support our Division's peer-reviewed publication, *Process Safety Progress,* which is available in both print and electronic versions so you can make use of its content and pass your hardcopy around as well. We will be looking this year at ways to encourage students to join the Safety & Health Division as well as AIChE.

Many thanks go to our outgoing Division Chair, Dr. Ronald J. Willey of Northeastern University. Ron has put a lot of time into our previous year's highly successful activities, and will continue to be on the Executive Committee as Past Chair. And congratulations to our newly elected Directors Brian Dunbobbin of Air Products and Brian Kelly of Bririsk Consulting, and to Pete Lodal of Eastman Chemical for his election to Second Vice Chair. I know our Division will greatly benefit by having these enthusiastic and highly competent gentlemen leading us forward in the years ahead.

And finally, if you have read this far, allow me to introduce myself as your Division Chair for the year 2008. I consider myself first a chemical engineer, and also a process safety consultant, author and teacher. After earning my BS and MS in chemical engineering from Purdue, I took a job at a Hercules plant that made solid rocket propellant motors. It was a great place to learn the technical and analytical aspects of safety. I then worked in large organizations (Du Pont and Battelle) before going to the other extreme and joining a three-person consultancy in Columbus, where I am now President. Our company now has over 100 employees after winning a major U.S. Department of Energy contract for providing safety and security support to the Office of Independent Oversight. I've had the privilege of being primary author of three CCPS books, and teach AIChE Continuing Education courses on HAZOP Studies and chemical reactivity. I'm also on the CCPS SACHE committee and teach loss prevention topics to senior chemical engineering students at the University of Cincinnati. My wife Sharon and I have five children and one grandson.

I hope you can join us in New Orleans this April for our annual S&H Division Dinner on Monday night on the Creole Queen. You are also welcome to sit in on your Division's Executive Committee meeting on Tuesday night. I look forward to a great year together with you, as our Institute celebrates its 100th Anniversary with special events throughout the year.

Bob Johnson

IN MEMORIUM

T. A. Ventrone (1925–2007)

Theodore A. Ventrone died on February 5, 2008 in Plainfield, NJ at the age of 92. Ted graduated with a bachelor's degree in chemical engineering from the University of Rhode Island in 1937. He was a pioneer in loss prevention and process safety, one of the key people in the early organization of the Loss Prevention Symposium, and was involved in the founding of the Safety and Health Division of AIChE. Ted was first employed at Factory Insurance Association (FIA) as a field inspector for process plants. During World War II, he served in the European Theater in the Army's Engineer Combat Battalion, was discharged as a major, and received the Bronze Star. Following the war, Ted returned to FIA until becoming loss prevention manager for American Cyanamid's Calco Division in Bound Brook in 1953. He continued in that position for 26 years, retiring in 1980. Ted was the founding editor of Plant/Operations Progress, later Process Safety Progress, and held that position for 22 years. Ted was an AIChE Fellow, and received the Walton/Miller Award in 1992 for his contributions to chemical process safety. Ted Ventrone was always particularly pleased by the annual presentation of the Ted Ventrone Award for Application of the Principles of Inherent Safety in the annual AIChE student design competition, presented in his honor each year by the Safety and Health Division to recognize process safety achievement in the next generation of chemical engineers.

Ted Ventrone was one of the early leaders in process safety and loss prevention, and will be missed by his many colleagues and friends in the field.

SAFETY AND HEALTH DIVISION 2008 ELECTION RESULTS

The results of the ballot for this year's slate of officers are as follows:

Chair:	Robert Johnson (by succession)
First Vice Chair:	Katherine Pearson (by succession)
Second Vice Chair:	Peter Lodal
Treasurer:	Albert Ness
Directors – 2008 to 2010:	Brian Dunbobbin
	Brian Kelly

Congratulations to all, and thank you for your efforts on behalf of the Division.

If you are interested in participating in Safety and Health Division activities as an officer, Past Chair Ron Willey will be responsible for submitting a slate of candidates for the 2009 election. Please contact Ron (see contact information in the list of Division officers in this newsletter) by September 2008, so he has plenty of time to get the information necessary to prepare the ballot. As usual, we will be electing two Directors for a three year term (2009 to 2011), a Treasurer, and a Second Vice Chair. The current Second Vice Chair will move up to First Vice Chair, and the First Vice Chair will become the Division Chair for 2009.

ARTICLES AND PAPERS OF INTEREST

1. "DISPOSE: Large Scale Experiments for Void Fraction Measurement During Venting" by Snee, T. J. et al, Health and Safety Executive Research Report RR587 (2007)(available for download from www.hse.gov.uk).

The AWARD (Advanced Warning and Runaway Disposal) Project addressed the needs to detect runaway initiation in advance so that appropriate countermeasures can be taken and to design emergency relief systems. The missing step in design of runaway reactor relief systems was the availability of reliable methods for predicting level swell in the reactor during venting and hence the quality of liquid requiring to be dealt with by a disposal system (quench tank, catch tank, etc.). The primary objective of the DISPOSAL part of AWARD was "To produce a methodology for the design of disposal systems to protect the workers and the environment from the effects of pressure relief of runaway chemical reactions. The methodology needs to be capable of producing a disposal system, which is adequate but not significantly oversized."

2. "Application of Runaway Reaction Mechanism Generation to Predict and Control Reactive Hazards" by Wei, C., Rogers, W. J., and Mannan, M. S., Computers & Chemical Engineering, Vol. 31, Issue 3, pp. 121-126 (January 2007).

Many industrial incidents are caused by thermal runaway reactions. Therefore, a good understanding of runaway reactions is necessary to predict and control reactive hazards. A detailed kinetic modeling approach is proposed to simulate runaway reactions under industrial conditions. This paper addresses the first step of this approach—mechanism generation. Computational chemistry was employed to estimate thermodynamic properties of reactants, intermediates, and products, and the Evans-Polanyi linear free energy relationship was used to estimate activation barriers of elementary reactions. To illustrate this mechanism generation approach, hydroxylamine is used as an example. The distribution of the predicted final products agrees with experimental results.

3. "Hotspot Distribution While Shortstopping Runaway Reactions Demonstrate the Need for CFD Models" by Dakshinamoorthy, D. and Louvar, J. F., Chem. Eng. Commun., Vol. 193, No. 5, pp. 537-547 (May 2006).

Runaway reactions continue to be a problem in the chemical industry. A recent study showed that 26.5% of major chemical plant accident is due to runaways. Runaways are caused by (a) mischarges of the reactants, catalysts, or contaminants or (b) loss of temperature control. Our studies cover the concept of shortstopping the runaway reactions to prevent accident scenarios. Experiments were conducted with CFD (Fluent) models. Shortstopping runaway reactions can be carried out by (a) adding an inhibitor to neutralize the reaction and/or (b) adding a cold diluent to lower the rate of reaction. In this present work we study the characteristics of runaway reactions and inhibition techniques with a full 3-D CFD simulation to explore nonsymmetric addition points for inhibition. Our 3-D simulations are performed using the multiple reference frame method, and reactions are enabled using user-defined functions in Fluent. These CFD results show the distribution of hotspots that characterizes the shortstopping performance. They also clearly demonstrate the value of using CFD simulations in situations that are experimentally prohibitive.

4. “Fire Versus Non-Fire Contingencies: A Study of Pressure-Relief Device Sizing Risks” by Short, II, W. E., J. Press. Vessel Technol., Vol. 128, Issue 1, pp. 122-129 (February 2006).

There are tens of thousands of industrial manufacturing facilities operating throughout the world. Each chemical plant, petroleum refinery, pharmaceutical plant, and other manufacturing facility has equipment and piping systems that operate under pressure. In the event of excessive overpressure, equipment or piping failures could result in economic loss to business, environmental contamination, and health and safety risks. To reduce such risks, equipment and piping systems that operate under pressure must be protected from excessive overpressure. This is accomplished with the installation of pressure-relief devices which must be properly sized and specified for the intended service conditions. More specifically, overpressure protection is provided by pressure-relief devices that are sized, selected, specified and installed for the postulated governing overpressure contingency. To adequately size a pressure-relief device to provide overpressure protection for equipment and piping, several relief event scenarios always should be considered. In the U.S.A., federal and state regulations require operating industrial facilities to have risk management programs in place that include the design basis for safety-relief systems installed to protect pressurized equipment from overpressure. For new installations, the pressure-relief system philosophy should be established during the project design phase. However, for process facilities that have been in operation for many years, the original design basis and calculations for safety-relief devices often are no longer available. For existing pressure-relief, fitness-for-service assessments should include verification of the relief device size and specification, and review and substantiation of require documentation. This paper presents results from a study intended to examine which overpressure relief contingency, if any, most often governs the size of relief devices that are used to protect equipment and piping systems. The required elements of a pressure-relieving system sizing documentation program are described. The author emphasizes seven relief contingencies to be considered when sizing pressure-relief devices. Some restrictions and limitations of the codes and standards that are applied for design guidance of pressure-relief systems are challenged. For this study, relief device sizing data are compiled from a number of chemical and petrochemical project applications to provide a reasonable sample of contingencies that governed the sizes of existing and new safety-relief valves and rupture disks. The study results show that a significant number of pressure-relief devices presently installed in the U.S.A. likely are undersized. This further suggests, that, worldwide, an alarming number of pressure-relief devices may be undersized.

5. “Modeling Safety Aspects of Styrene Polymerization Processes” By Hungenberg, K-T et al, Ind. Eng. Chem. Res., Vol. 44, No. 8, pp. 2518-2524 (2005).

Various kinetic models for thermally initiated polymerization of styrene are compared concerning their description of isothermal batch polymerization as well as their prediction for runaway reactions. All models show good agreement for conversion in both isothermal and adiabatic situations, whereas predictions for molecular weight differ considerably. Pressure predictions according to Flory-Huggins and perturbed-chain statistical associating fluid theory equation of state (PC-SAFT EOS) also show good agreement considering a system from styrene/polystyrene only. For heterogeneous systems, such as suspension polymerization of styrene, various hazardous situations, like failure of the cooling system or cooling system and stirrer are assumed. The pressure predictions for runaway reactions mainly depend on the assumptions for the phase behavior. Realistic predictions, which take into account the solubility of water in styrene/polystyrene, are only possible with PC-SAFT EOS.

6. “Pressure Relief of Foaming Three Phase Systems” by Poli, M. and Steinbach, J., Paper presented at the AIChE 2007 Annual Meeting.

As part of safety concept, reactors and other high pressure containments have to be protected against excessive pressure by pressure relief devices such as burst disks or relief valves. Most design criteria and simulation tools have been developed for one and two-phase systems. Hence, to design foaming and non-foaming three-phase systems experimental investigations on the unsteady level swell and their discharge flow are still necessary. In order to gain a deeper knowledge under upset conditions, systematic studies were performed using a modified Adiabatic Pressure Dewar Calorimeter (ADC11). This project will finally lead to design criteria for an emergency relief system of reactive multiphase mixtures under various boundary conditions. In this experimental set-up, pressure and temperature profiles, as well as the total vented solid/liquid mass were measured. Non-stirred foaming systems consisting of two different surfactants with various concentrations in water and different solids were studied. Here, the filling level, solid mass fraction, initial discharge pressure, and vent size were kept constant. For each experiment the level swell was observed during the pressure relief through a camera. Moreover, stirred foaming three-phase systems were investigated.

7. “Runaway Reaction for Cumene Hydroperoxide at Low Temperature Conditions by Calorimetric Tests” by Chen, J-R et al, Paper presented at the NATAS 2007 Conference, August 25-29, 2007 at Michigan State University.

The exothermic decomposition of cumene hydroperoxide (CHP) in cumene was characterized by isothermal microcalorimetry, using the thermal activity monitor (TAM). Unlike the exothermic behavior previously determined from an adiabatic calorimeter, such as the vent sizing package 2 (VSP2), or differential scanning calorimetry (DSC), a TAM thermal curve revealed that CHP undergoes an autocatalytic thermal decomposition detectable between 75 and 90°C. Previous studies have shown that the CHP in the temperature range higher than 100°C conformed to an n-th order reaction rate model. CHP heat of decomposition and autocatalytic kinetics behaviors were measured and compared with previous literature, and the methodology and the advantages of using the TAM to obtain an autocatalytic model by curve fitting are discussed here. With various autocatalytic models, such as the Prout-Tomokins and the Avrami-Erofeev rate law, the best curves fit among models were also investigated and proposed.

8. “Thermal Runaway Hazards of Aqueous Tert-Butyl Hydroperoxide With Alkaline Contaminants” by Wang, Y-W, Duh, Y-S, and Shu, C-M, Ibid, Ref. 7 above.

Thermal runaway reactions associated with exothermic behaviors of tert-butyl hydroperoxide (TBHP) solutions reacting with alkaline contaminants were studied. A differential scanning calorimetry (DSC) was used to characterize these inherent behaviors of TBHP solutions with KOH, NaOH, LiOH, and NH_4OH. By thermal analysis, we compared various heats of decomposition of TBHP solutions with alkaline impurities, and determined the incompatible hazards of various TBHP solutions with alkaline contaminants.

9. “Runaway Reaction on Tert-Butyl Peroxybenzoate by DSC Tests” By Cheng, S-Y et al, Ibid, Ref. 7 above.

Tert-butyl peroxybenzoate (TBPB) is one of the sensitive and hazardous chemicals which have been popularly employed in petrifaction industries in the past. This study attempted to elucidate its unsafe characteristics and thermally sensitive structure so as to help prevent runaway reactions, fires or explosions in the process environment. We employed differential scanning calorimetry (DSC) to assess the kinetic parameters, such as exothermic onset temperature (To), heat of reaction (ΔH), frequency factor (A), and the other safety parameters using four different scanning rates (1, 2, 4, and 10°C min-1) combined with a curve-fitting method. The results indicated that TBPB becomes very dangerous during decomposition reactions; the onset temperature and reaction heat were about 100°C and 1,300 Jg-1, respectively. Through this study, TBPB accidents could be reduced to an accepted level with safety parameters under control. According to the findings in this study and the concept of inherent safety, TBPB runaway reactions could be thoroughly prevented in the relevant plants.

10. “Evaluation of Thermal Hazards for Dicumyl Peroxide by DSC and VSP2” by Hu, W-N et al, Ibid, Ref. 7 above.

In Asia, due to its unstably reactive nature, dicumyl peroxide (DCPO) has caused many thermal explosions and runaway reaction incidents in the manufacturing process. To analyze runaway behaviors of DCPO in the batch reactor, we studied thermokinetic parameters, such as heat of reaction (ΔHd), exothermic onset temperature (To), maximum temperature rise (dT/dt)max, maximum pressure rise (dP/dt), and self-heating rate, etc, via differential scanning calorimetry (DSC) and vent sizing package 2 (VSP2). The thermokinetic parameters were exploited to calculate and predict the self-accelerating decomposition temperature (SADT), temperature of no return (TNR), and time to maximum rate (TMR) by thermal safety software (TSS) series. The important values, such as SADT, TNR, TMR, are necessary and useful to predict hazardous conditions in the early assessment of a chemical process using DCPO.

NEW ORLEANS PROGRAMMING

The Center for Chemical Process Safety (CCPS), the Loss Prevention Symposium (LPS), and the Process Plant Safety Symposium (PPSS) are coordinating conferences again in 2008 to present the 4th Global Congress on Process Safety. This annual event is the primary forum for practitioners from the chemical and allied industries, academia, and government to share practical and technological advances in all aspects of process safety. The complete program for the Global Congress is summarized in the following pages. Also, you will find information about programming sponsored by the ACS Division of Chemical Health and Safety at the ACS Meeting, which will also be held in New Orleans at the same time as the AIChE meeting. ACS DCHAS and the AIChE Safety and Health Division are co-sponsoring several of the program sessions.

ACS DIVISION OF CHEMICAL HEALTH AND SAFETY OFFICERS AND COMMITTEE CHAIRS

Chair (2008)
Erik Talley
450 East 63rd Street, 8F
New York, NY 10021
(H) 212-207-3833
(W) 212-746-6201
(F) 212-746-8288
ert2002@ med.cornell.edu

Chair-Elect; Audit Committee Chair; (2009 Chair)
Russell W. Phifer
WC Environmental, LLC
PO Box 1718
West Chester, PA 19380
(W) 610-696-9220
(H) 610-869-0119
(F) 610-344-7519
rphifer@ glasmesh.com

Immediate Past Chair; Nominating Committee (2007 Chair)
Barbara L. Foster
West Virginia University
C. Eugene Bennett
Department of Chemistry
PO Box 6045
Room 217 Clark Hall
Morgantown, WV 26506-6045
(W) 304-293-2729
(F) 304-293-4904
bfoster@ wvu.edu

Treasurer (2009)
Neal Langerman
Advanced Chemical Safety
7563 Convoy Court
San Diego, CA 92111
(W) 858-874-5577
(F) 858-874-8239
neal@chemical-safety.com

Secretary (2009); Web site and E-mail Administrator
Ralph Stuart
University of Vermont
667 Spear St.
Burlington, VT 05405
rstuart@uvm.edu

Councilor (2008)
Kathryn Benedict
Grand Valley State University
CLAS - Deans Office 312 Padnos Hall
Allendale, MI 49401

Councilor (2010)
George H. Wahl, Jr.
Box 8204, Department of Chemistry
North Carolina State University
Raleigh, NC 27695-8204
(W) 919-515-2941
(F) 919-515-2545
george_wahl@ncsu.edu

Alternate Councilor (2010) and Long Range Planning
Laurence Doemeny
4922 Armin Way
San Diego, CA
92115-1002
(H) 619-265-8154
ldoemeny@cox.net

JCHAS Editor
Harry J. Elston
Editor, Chemical Health and Safety
Midwest Chemical Safety
9380 Wandering Trails Lane
Dawson, IL 62520
(W) 217 971-6047
(F) 217 364 9626
helston@bigfoot.com

Member-at-Large (2010)
Ken Fivizzani
Nalco Company
1601 West Diehl Road
Naperville, IL 60563
Phone: 630-305-2032
Fax: 630-305-2982

Training and Workshops Coordinator
Russell W. Phifer
WC Environmental, LLC
PO Box 1718
West Chester, PA 19380
(W) 610-696-9220
(H) 610-869-0119
(F) 610-344-7519
rphifer@glasmesh.com

Awards
Douglas Walters
Environmental and Chemical Safety
Educational Institute
6807 Breezewood Rd.
Raleigh, NC 27607
919-851-1465
waltersdb@earthlink.net

Program Chair / Fall Meetings
Stefan Wawzyniecki
Dept EH&S Unit 4097
University of Connecticut
3102 Horsebarn Hill Road
Storrs, CT 06269-4097
(860)486-1110
stefan.w@uconn.edu

Program Chair / Spring Meetings
Debbie M. Decker
Environmental Health and Safety
University of California, Davis
1 Shields Ave.
Davis, CA 95616
530-754-7964 (office)
530-752-1493 (EH&S main office)
530-752-4527 (FAX)
dmdecker@ucdavis.edu

Social Chair
Pat Schumann
Environmental, Health and Safety
Manager
QC Manager
ImaRx Therapeutics, Inc.
1635 E. 18th Street
Tucson, AZ 85719
PSchumann@IMARX.COM

Archives; Speaker's Bureau
James Kaufman, Chair
The Laboratory Safety Institute
192 Worcester Road
Natick, MA 01760-2252
(W) 508-647-1900
(F) 508-647-0062
labsafe@aol.com

Membership
Kim Jeskie
Oak Ridge National Laboratory
PO Box 2008, MS 6230
Oak Ridge, TN 37831-6230
(865)574-4945
jeskiejb@ornl.gov

AICHE SAFETY AND HEALTH DIVISION OFFICERS

Chair
Robert W. Johnson
Unwin Company
1920 Northwest Boulevard, Suite 201
Columbus, OH 43212-1197
614-486-2245
614-486-2141 (FAX)
rjohnson@unwin-co.com

First Vice-Chair
Katherine Pearson
Rohm & Haas Company
6519 State Highway 225
Deer Park, TX 77536
281-228-8236
281-228-8675
katherinepearson@rohmhaas.com

Second Vice-Chair
Peter N. Lodal
Eastman Chemical Company
Tennessee Division – Bldg 18
P. O. Box 511
Kingsport, TN 37662
423-229-2675
423-229-3949 (FAX)
pnlodal@eastman.com

Past Chair
Ronald J. Willey
Northeastern University
Department of Chemical Engineering
342 Snell Engineering Center
Boston, MA 02115
617-373-3962
617-373-2209 (FAX)
r.willey@neu.edu

Secretary-Treasurer
Albert Ness
Rohm & Haas Company
Engineering Division
3100 State Road
Croydon, PA 19021
215-785-7567
215-785-7077 (FAX)
aness@rohmhaas.com

Director (2006 – 2008)
Cheryl A. Grounds
BP Exploration & Production, Inc.
501 Westlake Park Boulevard
Houston, TX 77079-2696
281-366-4740
281-366-7969 (FAX)
cheryl.grounds@bp.com

Director (2006 – 2008)
Lisa Long
U. S. Department of Labor - OSHA
Office of General Industry Enforcement
200 Constitution Avenue, NW
Washington DC 20210
202-693-2409
long.lisa@dol.gov

Director (2007 – 2009)
David D. Herrman
DuPont Company
1007 Market Street (B7246)
Wilmington, DE 19898
302-774-1766
302-773-6508
david.d.herrmann@usa.dupont.com

Director (2007 – 2009)
Philip M. Myers
Advantage Risk Solutions
P O Box 510
Sunbury OH 43074
740-965-6304
740-965-9159 (FAX)
pmyers@arisksolution.com

Director (2008 – 2010)
Dr. Brian R. Dunbobbin
Air Products & Chemicals, Inc.
7201 Hamilton Boulevard
Allentown, PA 18195-1501
610-481-6736
610-481-7157 (FAX)
dunbobbr@apci.com

Director (2008 – 2010)
Brian D. Kelly
Bririsk Consulting Ltd.
121 Royal Bay NW
Calgary AB T3G 5J6
403-375-0709
403-375-0710 (FAX)
kellybd@telus.net

AIChE Liaison to Division
Felicia Guglielmo
American Institute of Chemical Engineers
Three Park Avenue
New York, NY 10016-5991
212-591-7329
212-591-8882
felig@aiche.org

Center for Chemical Process Safety Liaison to Division
Karen E. Person
Center for Chemical Process Safety
American Institute of Chemical Engineers
Three Park Avenue
New York, NY 10016-5991
212-591-7319
212-591-8895 (FAX)
karep@aiche.org

Chemical Technology Operating Council Liaison to Division
Stephen Smith
American Institute of Chemical Engineers
Three Park Avenue
New York, NY 10016-5991
212-591-7335
212-591-8883 (FAX)
steps@aiche.org

Webmaster
Emil H. Groth
Michigan Technological University
Minerals & Materials Building, Room 727
Houghton, MI 49931
906-487-2079
906-487-2782 (FAX)
ehgroth@mtu.edu

Process Safety Progress Editor
Daniel A. Crowl
Michigan Technological University
Department of Chemical Engineering
1400 Townsend Drive
Houghton, MI 49931
906-487-3221
906-487-3213 (FAX)
crowl@mtu.edu

Process Safety Progress Editor
Joseph F. Louvar
Wayne State University
Department of Chemical Engineering
5050 Anthony Wayne Road
Detroit, Michigan 48202-9988
313-577-9358
313-577-3810 (FAX)
jlouvar@ameritech.net

Newsletter Editors
John F. Murphy
hamjfm@embarqmail.com

Dennis C. Hendershot
d.c.hendershot@att.net

4th Annual Global Congress on Process Safety - 2008

April 7, 2008 Monday Morning

Session #19: Joint CCPS/LPS/PPSS Plenary Session (Location: Morial Convention Center, Hall E-2)

8:00	Introductions & Welcome, Pete Lodal & Scott Berger
8:10	- Cheryl Grounds, CCPS Chair - Dave Clark, LPS Chair - Jack Chosnek, PPSS Chair
8:20	Keynote Address: Invited Speaker, Mr. Edwin Foulke, Jr., Assistant Secretary of Labor, U.S. Department of Labor, Occupational Safety and Health Administration
9:00	William H. Doyle LPS Best Paper Award
9:05	CCPS Featured Paper: Recommended Global Process Safety Metrics, Tim Overton
9:30	**Coffee and Networking Break in Exhibit Hall**

	42nd Annual Loss Prevention Symposium	10th Process Plant Safety Symposiun	23rd CCPS International Conference
	Session #48: Fire, Explosion and Reactive Hazards, Part I	Session #47: Applications of Safety Culture	Session #49: Risk Learnings
	Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
	Session Co-Chairs: Robert Benedetti & Dennis Hendershot	**Session Co-Chairs: Colin Howat & Sam Mannan**	**Session Chair: Karen Person**
10:15	Estimating Flame Speed for Use with the BST Blast Curves, Timothy Melton	**Lessons from Safety Culture Evaluations at Process Facilities, Steve Arendt**	Three Years On From Texas City, Mike Broadribb
10:45	On the Possibility of DDT in Vapor Cloud Explosions, Kees van Wingerden	Spot The Hazard! A Cultural Extension of Hazard Identification Training, Robert Wasileski	Lessons Learned while Developing and Implementing Company Process Safety Metrics, John Herber
11:15	Hydrocarbon Haze and ASU Safety, William Schmidt	Establishing A Personal Philosophy for Promoting Safety, Health and Environmental Excellence, James Gary et al	Structural Capital A Unique Management Tool for Achieving Higher Level in Quality and Safety, P. N. Trivedi
12:00 Noon	**LUNCHEON WITH SPEAKER: Mr. Xu Gang, Sinopec**		

April 7, 2008 Monday Afternoon

	Session #60: Fire, Explosion and Reactive Hazards, Part II	**Session #61: Plant Process Safety Management Systems**	**Session #55: Human Factors**
	Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
	Session Co-Chairs: Hank Gurry & Chris Hanauska	**Session Co-Chairs: Bill Vogtmann & Donald Abrahamson**	**Session Chair: John Herber**
1:30	Evaluating Kinetic Parameters for Solid Substances Exhibiting Complex Self-Heating Behavior, Delmar Morrison, Russell Ogle	Retool Your PSM Program for Efficiency and to Meet Multiple Management System Requirements, Phil Myers	Human Factors Programs within Contra Costa County, Michael Dossey
2:00	Modeling Spills of Reactive Chemicals such as Oleums & Chlorosulfonic Acid, Seshu Dharmavaram	Improved Process Safety Management and Simple Metrics, Jack Chosnek et al	HSE Management Practice in SINOPEC——Focus on Behavior of Employees, Mu Shanjun
2:30	Isothermal Decomposition of Hydroxylamine and Hydroxylamine Nitrate in Aqueous Solutions in the Temperature Range 353-400 K, Lijun Liu	Strengthening Process Safety Requirements in HSE Management System-an NOC's Experience, Morris Kho	Process Industry Tool for Operator Action Analysis, Diah Indriani Widiputri and Katharina Lowe
3:00	**Coffee and Networking Break in Exhibit Hall**		
	Session #60: Fire, Explosion and Reactive Hazards, Part II	**Session #61: Plant Process Safety Management Systems**	**Session # 82: Learning & Culture**
	Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
	Session Co-Chairs: Hank Gurry & Chris Hanauska	**Session Co-Chairs: Bill Vogtmann & Donald Abrahamson**	**Session Chair: Cheryl Grounds**
3:30	A New Testing Facility to Characterize ESD Hazards in Industrial Baghouse Filters, Samual Mauger	Implementation of DHS Chemical Facility Antiterrorism Standards, David Moore	Learning from the Past: Making sure that lessons from past major incidents are known and kept alive Frederic Gil
4:00	Towards a Global Standard for Flammability Determination, Erdem Ural	Deploy Six Sigma Methodology to Improve Process Safety, Muthukrishnan	Implementing Process Safety - Kuwait Petroleum Corp., Ujwal Ritwik
4:30	A Method for Determining the Flammable Limits of Gases in a Spherical Vessel, Dan Crowl	Quality Assurance and Process Safety Management, Angela Summers	Minimizing the use and hazard of solvents during process design, Julie Manley

Monday Eve.

7:00 PM	**Safety and Health Division Ticketed Dinner with Keynote Sam Mannan, "From Bangladesh to Aggieland: An Interesting Journey for a Chemical Engineer - Creole Queen, a New Orleans Paddlewheel**

		42nd Annual Loss Prevention Symposium	10th Process Plant Safety Symposiun	23rd CCPS International Conference
April 8, 2008 Tuesday Morning		**Session #85: Laboratory and Pilot Plant Safety**	**Session #88: Maintaining Instrument and Mechanical Integrity**	**Session #84: Key Performance Indicators, Part 1**
		Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
		Session Co-Chairs: Daniel Crowl & Walt Frank	**Session Co-Chairs: Kathy Pearson & Steven Emerson**	**Session Chair: Jim Muoio**
	8:00	The AIChE Chem-E-Car Safety Program, Ronald Willey	Safe Management of Unforeseen Delays in Mechanical Integrity Inspection Schedules, James Willis et al	Dynamic Model of Process Safety Management, Americo Diniz
	8:30	Enhancing the Undergraduate ChemE Lab with an Industrial Process Safety Approach, Bruce Vaughen	Recent Developments and Technology Improvements in API Risk-Based Inspection Planning Technology, Philip Henry	Key Performance Indicators (KPIs): Consequence-Based Metric for the Assessment of Inherent Safety, Valerio Cozzani
	9:00	Safely Scale-up Processes and Accommodate Recipe Changes, Amy Theis	The Family Tree of Protective Requirements Specifications, Kevin Klein	The Evolution and Current Status of Process Safety Management Metrics within DuPont, David Cummings
	9:30		**Coffee and Networking Break in Meeting Hall**	
		Session #116: Hazards of Alternative Fuels Technologies	**Session #88: Maintaining Instrument and Mechanical Integrity**	**Session #117: Key Performance Indicators, Part II**
		Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
		Session Co-Chairs: Walt Frank & Daniel Crowl	**Session Co-Chairs: Kathy Pearson & Steven Emerson**	**Session Chair: Jatin Shah**
	10:15	CNG and Hydrogen Vehicle Fuel Tank Failure Incidents, Testing, and Preventive Measures, Robert Zalosh	Risk Analysis for Operation of Aluminum Heat Exchangers Contaminated by Mercury, Mark Wilhelm	The Use of the Pareto Shape Parameter as a Leading Indicator of Process Safety Performance, Fred Henselwood
	10:45	Comparative Fire Risk of Motor Vehicle Fuels: Gasoline vs. E-85 Ethanol, Scott Dillon	Analysis of Pressure Relief Valve Proof Test Data: Findings and Implications, Julia Bukowski et al	Applied Risk-Based Process Safety: A Consolidated Risk Register and Focus on Risk Communication, Tracy Whipple & Robin Pitblado
	11:15	NFPA Hydrogen Technologies Code Project, Carl Rivkin	Fire Protection for Extremely Corrosive Industrial Duct Environments, Su et al	Hydrogen Pipeline Compressor Incident Changes Standard Procedures, A. Daniel Fazekas
	12:00 Noon		**LUNCHEON WITH SPEAKER - Mark Dreux**	
April 8, 2008 Tuesday Afternoon		**Session #120: Advances in Fire and Explosion Suppression**	**Session #122: Conduct of Operations for Process Safety**	**Session #118: Layers of Protection Analysis (LOPA)**
		Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
		Session Co-Chairs: John E. Going & Henry L. Febo	**Session Co-Chairs: James Thompson & Douglas Ferguson**	**Session Chair: Tom Dileo**
	1:30	Experimental Study of Effective Water Spray Curtain Application in Controlling LNG Vapor Clouds, Morshed Rana	Improving Process Safety by Addressing the Human Element, John Haesle	Committing to Process Safety--A Reliance Experience - Sushil Kumar
	2:00	The Victaulic "Vortex" Multiple Agent Fire Extinguishing System, Bill Reilly	Evaluating Operational Discipline in PSM Audits, James Klein	LOPA at Existing Facilities, J. Baik, M. Gentile
	2;30	Effects of System and Agent Properties on Room Pressurization, John Schaefer	A Site-Based Workshop for Improving Operational Discipline, James Klein	Use of Procedural Based Controls in Layer of Protection Analysis, Randy Freeman
	3:00		**Coffee and Networking Break in Exhibit Hall**	
		42nd Annual Loss Prevention Symposium	10th Process Plant Safety Symposiun	23rd CCPS International Conference
		Session #120: Advances in Fire and Explosion Suppression	**Session #122: Conduct of Operations for Process Safety**	**Session #147: Inherent Risk**
		Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
		Session Co-Chairs: John E. Going & Henry L. Febo	**Session Co-Chairs: James Thompson & Douglas Ferguson**	**Session Chair: Steve Meszaros**
	3:30	Simulation of explosion suppression systems and extinguishing barriers using the CFD code DESC, Trygve Skjold	PSM Knowledge Management and Applications Across Sister Plant Technologies, Cummings	Improvements in the Safety Screening of Resin Manufacturing Processes, George Kalfas
	4:00	Automatic Fire & Explosion Detection and Suppression for Special Hazards, Estee Jacobson	Yellow Lining" for Re-commissioning and Start-up, Doug Burroughs	Inherent Risk Assessment, Azmi Mohd Shariff
	4:30	Advances in Explosion Suppression Product Safety, Reliability, and Performance, Emre Ergun	Process Safety: "Walk Through Review", I Made Sukrajaya	Application of an Emergency Egress Risk Index System and Evaluation of Protection Layers in the Determination of Life Safety Requirements for Open Structure Industrial Occupancies, Kelly Mansfield, Tom Rodante

April 8, 2008 Wednesday Late Afternoon

	Session #148: Global Congress on Process Safety - Joint Poster Session and Reception (Location: Morial Convention Center, Hall E-2) Session Chair: Pete Lodal	
5:00-6:15	**Paper Title**	**Author**
	Passive Device Technology: The Trend away from Reliance upon Valving Syatems to address Line Failure	Andy Abrams
	Risk Based Method to Establish Inspection Intervals for PRDs	Valerie Magyari
	Chemical Safety Database - Application for Explosion Limits of Biogases	Maria Molnarne
	Development of a Methodology for Toxic and Flammable Gases Sensors Positioning in Oil Platforms	Carneiro dos Santos
	A Graphical Approach for Representing Hazard Scenarios	Rafael Batres
	Obstacle Effects on Vented Gas Explosion Pressures	Robert Zalosh
	How to apply Process Safety Management to Capital Projects	Hunter Shang
	Explosion in skid mounted Hydrogen compressor panel	Shantanu Date
	Electrical Flash and Fire in Sub-Station	Sikander Khan
	Case Study of a Hydrogen Explosion in an Electrical Panel	Tim Myers
	Chemically Unstable Gases	Volkmar Schröder
	Effects of Polyethylene Size on Ignition of Electrostatics Discharge	Yi Liu
	GE GasTurbine Design In OG Applications According To IEC62061 Requirements VS CE Marking	Vincenzo Amato
	Domino Effects Research in the Safety Assessment of Petrochemical Enterprises	Zhao Dongfeng
	Robust and Reliable Modelling for a Distillation Column	Yahya Chetouani
	Relevance Of Safety, Health and Environmental (SHE) Factors in Siting Of Chemical Industries	R.K. Elangovan
	Specialized Working Procedure	I Made Sukrajaya
	Prediction of the Source Location and Rate of a Chemical Release for Emergency Response: Reverse Corridor/Back	Suneetha Burla

April 9, 2008 Wednesday Morning

	42nd Annual Loss Prevention Symposium	10th Process Plant Safety Symposiun	23rd CCPS International Conference
	Session #152: Incident Analysis and Management Systems	**Session #153: Hazard Identification and Risk Assessment Tools**	**Session #150: Process Safety Management**
	Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
	Session Co-Chairs: Erdem Ural & Randy Freeman	**Session Co-Chairs: Philip Myers & Sanjeev Saraf**	**Session Chair: Don Connolley**
8:00	Oops, sorry! And Other Safety System War Stories, Paul Gruhn	LOPA Misapplied: Common Errors Can Lead to Incorrect Conclusions, Study et al	The Benefits of Comparing Similar Hazards across 'Sister' Plants, Tony Downes
8:30	Analysis of One Company's Process Safety Incidents, Al Ness	Evaluating Protection Layers That Are Not Independent, Bob Stack	Management of Organizational Change, Rodolphe Gaucher
9:00	Investigating Beyond the Human Machinery - A Closer Look at True Accident Causation in High Hazard Industries, Cheryl Mackenzie	Managing the Intolerable, Fred Henselwood et al	Recent Developments in the Analysis of Fires, Explosions and Production Disruption Incidents in Chemical Plants and Oil Refineries, Dale McIntyre and Emory Ford
9:30	**Coffee and Networking Break in Meeting Hall**		
	Session #152: Incident Analysis and Management Systems	**Session #153: Hazard Identification and Risk Assessment Tools**	**Session #180: Process Safety as Applied to Capital Projects**
	Location: Morial Convention Center, Rooms 356-357	**Location: Morial Convention Center, Room 352**	**Location: Morial Convention Center, Rooms 353-355**
	Session Co-Chairs: Erdem Ural & Randy Freeman	**Session Co-Chairs: Philip Myers & Sanjeev Saraf**	**Session Chair: David Lewis**
10:15	Learning from Incidents - A Practical Application, Trish Kerin	Process Infrastructure Hazards Analysis and Facility Siting, Ferguson	Controlling Risk During Major Projects, William Bridges
10:45	What I Learned as an Investigator with the CSB, Part 2, Effective Investigation, John Murphy	A Semi-Quantitative Risk Assessment Methodology to Address Deficiencies, Kumar Bhimavarapu et al	Case Study of a Facility Siting Analysis carried out for a FSRU, Anish Ravi
11:15	Using Measured Performance as a Process Safety Leading Indicator, Kenneth Harrington, Harold Thomas, and Shakeel Kadri	Expanding Known Process Safety and Risk Analysis Concepts to Manage Security Concerns, don Abrahamson et al	Process Plant, Pre-commissioning, Commissioning and Start-Up Digest, Safdar Toor
12:00 Noon	**LUNCHEON WITH SPEAKER - William Wright**		

April 9, 2008 Wednesday Afte

	Session #193: Case Histories and Lessons Learned - Joint Session and Co-Sponsored by ACS (Location: Morial Convention Center, Hall E- **Chair John F. Murphy, Co-Chairs: Albert Ness, Lisa Long, & Antoinette Wenzel,**
1:30	Fire and Explosion in an Explosives Conditioning Bunker, Timothy Meyers
2:00	A Series of Small Changes, John Wincek
2:30	Combustible Dust Explosion Case History, Kelly Thomas
3:00	**Coffee and Networking Break in Exhibit Hall**
	Session #193: Case Histories and Lessons Learned - Joint Session and Co-Sponsored by ACS (Location: Morial Convention Center, Hall E-
3:30	Case Study: The Importance of Reliable Inertisation and Earthing of Ignition Sensitive Powder Handling Systems, W. Roper
4:00	HCl Tank Explosion, C. Chandwadkar
4:30	Synthron Runaway Reaction and Vapor Cloud Explosion, Jim Lay

American Chemical Society

DIVISION OF CHEMICAL HEALTH & SAFETY

Monday, April 7, 2008

EVENING

8:00 PM-10:00 PM

Sci-Mix
Morial Convention Center -- Hall A

Tuesday, April 8, 2008

MORNING

9:00 AM-12:00 PM

Laboratory Safety Incidents and Near Misses: Case Studies and Lessons Learned ACS Division of Chemical Health & Safety and AIChE Loss Prevention Symposium (Area 11a), Division of Professional Relations, and ACS and AIChE Cosponsored Programming‡
Morial Convention Center -- Rm. 336

AFTERNOON

1:30 PM-4:00 PM

Laboratory Safety Incidents and Near Misses: Case Studies and Lessons Learned ACS Division of Chemical Health & Safety and AIChE Loss Prevention Symposium (Area 11a), Division of Professional Relations, and ACS and AIChE Cosponsored Programming‡
Morial Convention Center -- Rm. 336

Wednesday, April 9, 2008

MORNING

9:00 AM-12:30 PM

Risk Assessment and Assessment of Toxicology Using Control Banding
Morial Convention Center -- Rm. 336