

IChem^E

**SAFETY & LOSS
PREVENTION
SUBJECT GROUP**

S & L P S G *Newsletter*

ISSUE 8

SUMMER 1997

FROM THE EDITOR

When I started compiling your Newsletter in the Summer of 1994 it was a black and white production which appeared irregularly and was of somewhat variable content. Since then we have moved to the current format with contents that I hope readers find more interesting and useful. The biannual Newsletter has appeared regularly, at least until this last spring when a combination of pressure at work and circumstances at home meant that I was unable to produce issue 8 on time. We had thus come full

circle and it was obviously the time to attract some new (and younger!) blood to take over the reigns. The S&LP SG committee were therefore delighted when Lucy Johnson offered to become the new editor at our AGM in May. So issue 8 is a joint effort, my last, and her first. I wish her well and encourage you, our readers, to support her with a veritable deluge of potential copy! Happy reading.

*Simon Waldram and Lucy Johnson,
September 1997*

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IOD news and a response from the Chairman of the Health and Safety Commission.

On page 11 of issue 7 of our Newsletter we published part of a lead article in the June 1996 Institute of Directors News. This originally appeared under a banner headline "IOD urges cutbacks to health and safety burden." We finished the quotation with the words "Fair comment or ignorant criticism? Your views would be welcome."

In fact the only response (are there any readers out there?) came from the Chairman of the Health and Safety Commission, Frank Davies, CBE OStJ. He stresses that he would be most interested to hear the views of our members and you are encouraged to send these to him, c/o our Editor whose address is on the front page.

In the interests of balance Frank Davies did ask us to report that both the Health and Safety Commission and the Health and Safety Executive went to some lengths to rebut the criticisms made by the Institute of Directors. They felt that the IOD paper was poorly researched and that the evidence cited did not support their assertion that the Health and Safety Executive is widely seen as an oppressive organisation. Mr Davies also drew attention to efforts over the last few years to simplify legislation, improve targeting and consistency of enforcement and enhance quality of guidance. Much of this involved extensive consultation with businesses.

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<i>DUST EXPERT</i>	<i>3</i>	An article investigating the phenomenon of hydraulic shock, including recommendations for the reduction of potential hazards from this phenomenon.	
<i>CHANNEL TUNNEL FIRE NOVEMBER 1996</i>	<i>7</i>	<i>MAJOR FIRE RESULTING FROM UNDER-LAGGING CORROSION</i>	<i>21</i>
A summary of the inquiry into the fire on heavy goods vehicle shuttle 7539 on 18 November 1996 produced by the Channel Tunnel Safety Authority		The potential hazards associated with under-lagging corrosion are highlighted, with recommendations for the reduction or elimination of this corrosion process.	
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LESSONS I DID NOT EXPECT TO LEARN

THE SECOND IN A SERIES BY

MARTIN PITT

Not all lessons come from formal presentations. Martin Pitt continues his observations on educational experiences while attending S&LPSG meetings, but which were not part of the programme!

On arrival I went to the ground floor toilet and noticed that all the cold water taps were colour coded green instead of blue. As I surmised, they were blue on the upper floors. Why was this? Because blue is the colour code for cold water, whereas green is the colour code for drinking quality water. Inspection of the pipework showed that one tap on each floor was separately piped in a manner consistent with direct mains supply.

What is likely to have happened is that one box of green taps was supplied along with several boxes of blue ones. The intention was to have a green handle on the single drinking water tap on each floor. Instead the plumber used up the green box on the

first toilet and then used blue for all other cold taps, whether drinking water or not.

This is an example of a colour code which was either not understood by the person responsible for implementing it or was ignored on the grounds of laziness. There was clearly no adequate quality control of the work. The net result was errors of both kinds: drinking water taps not being specially marked, and non-drinking water taps being marked as safe to drink.

I have actually observed this in three separate institutions. In one there was a sign saying 'drinking water' above one tap at one end of a row of green taps, but this could still suggest that they were all safe to drink. As with the modification to lighting related in the previous article on this series, the error had not been corrected after several years.

Martin Pitt
University of Sheffield

STOP PRESS STOP PRESS STOP PRESS

***LOOK OUT FOR THE COMPETITION FOR
BEST CHEMICAL ENGINEERING SAFETY MYTH OF 1997 BY SIMON
TURNER, SAFETY & LOSS PREVENTION SUBJECT GROUP CHAIRMAN,
DUE TO BE PUBLISHED IN THE CHEMICAL ENGINEER
ON 25 SEPTEMBER 1997.***

VIRTUAL REALITY (VR) MODELS SAFETY APPLICATIONS

**SAFETY & LOSS PREVENTION SUBJECT GROUP MEETING HELD ON
28TH JANUARY 1997, AT SILICON GRAPHICS, READING.**

The meeting was a demonstration of virtual reality models in the Silicon Graphics "Virtual Reality Room". The room could accommodate up to 30 people with a centre seat having a joystick and other attachments. The display was run from a management console by a trained operator. Seven models were demonstrated using a 170 degree "wrap-around screen" and three dimensional sound:

1. Airplane cockpit take-off and landing.... pronounced sensory effects were felt by viewers.
2. Lorry driver training simulator....tests events included, fog, snow, other vehicle activity.
3. Offshore platform walk through.... similar to CAD systems.
4. Two Ford taurus cars in collision.... visualisation of simulation model that was run offline.
5. Birdeye views of oil tanker spill fire and oil rig fire.
6. Paris rail driver training simulator.... test events included passenger volume and activities.
7. State of the art demonstration of the latest capability....reflections and shadows of high quality.

From the demonstration and subsequent discussion, some potential safety applications of VR were identified as detailed below:

Intermediate

- Interactive training.
- Ergonomics design of for example, Control Panels, Layouts, Pipework, etc.
- Emergency training simulation and planning.

Near Future

- Superimposition of numerical/analytical models on to structures and spatial models.
- Design of safe process systems using combination models.
- Construction planning, for example, planning heavy lifts.

Distant future

- Quantitative Risk Analysis.
- Consequence modelling.

The main problem with VR is the sheer amount of digital data that needs to be processed for a realistic display. Therefore, technical simulations, such as a car crash, cannot be run in real-time and have to be played back as a sequence of simulation snap shots. Real time systems need to be relatively simple.

There have been no validation calculations carried out for any of the consequence type displays as presented by the VR images listed above. This means that any VR display, for consequence modelling, is only as good as the consequence calculation package used as a basis for generating the display. Even if the consequence package does produce the results required for good VR imaging, the calculations are still going to take a long time; therefore, the VR imaging for consequence calculations will be time lapsed. This is a major disadvantage for Design Safety Issues where repeated calculations for a lot of scenarios are most useful and the consequence models need more information and developments.

The advantage of VR is the visualisation aspect for mobile systems. This makes VR ideal for training modules where people have to respond to visual stimuli. Even though VR is currently very visually based, extension to sound is not seen to be a difficult accomplishment, provided the modelling is available. Other senses are currently not catered for but could be very useful for enhancing the emergency response training modules. The costs of data handling and models construction were not known, but expected to be high.

MEETING REPORT: CORPORATE LIABILITY

ICHEME SAFETY AND LOSS PREVENTION SUBJECT GROUP

CORPORATE LIABILITY SEMINAR 12 MARCH 1997

FOSTER WHEELER, ALDWYCH HOUSE

Subject: Corporate Responsibility Report

There were five excellent presentations at this seminar. The overheads have been copied and put into an information pack held in the IChemE Library. This pack includes a copy of the book: Zeebrugge Lessons in Corporate Responsibility. This book ought to be considered compulsory reading for company executives of business carrying risks which can potentially affect the public. No interest was shown from chemical industry commercial managers; which was surprising for such a critically sensitise business topic.

The programme is attached. The important points are summarised:

The public and pressure groups will continue to strive for greater accountability of companies when disasters occur and many lives are lost. Accountability will not be confined to crisis management of a disaster but invade every aspect of the business, which contributes to any loss of life; this will include exposing sloppy management in a very public way.

Companies can co-operate in recording how accidents happen, without compromising their business activities or threatening their employees. British Airways are globally co-ordinating just such an open reporting exercise on behalf of all airlines.

Audit reports, to demonstrate responsible discharge of duties, are a measure of effective safety management and can be effective for Defending Council in court.

Executives, poorly informed about safety management, who are interviewed about

disasters for which their company is involved, are now more likely to be crucified in the media and subsequently selected for cross examination by Prosecution Council. Such events would affect market performance and could break the company.

It is not possible to ensure against criminal wrongdoing. Such losses have to be borne by the company.

Simon Turner
S&LPSG Chairman

CORPORATE LIABILITY

Wednesday 12 March 1997

Aldwych House, Foster Wheeler, Reading

Programme

- 10.30 Registration and Coffee
- 11.00 *Companies Should be Held Liable*
Peter Spooner (Deputy Chairman of the Herald Families Association)
- 11.45 *Corporate Liability in Relation to Crisis Management*
Jamie Jameson (Senior Crisis Management Adviser with Link Associates)
- 12.30 Lunch
- 13.30 *British Airways View in Relation to Air Accident Database*
Roger Whitefield Chief Air Safety Investigator with British Airways)
- 14.15 *Looking Through the Other End of the Telescope*
Gareth Jessop (Pennone & Partners)
- 15.00 *Insurance Implications*
Graham Long (Sedgwick Energy and Marine Ltd)
- 15.45 Tea/ END

S & LP SG ACTIVITIES – “IN THE PIPELINE”

- | | |
|----------------------|---|
| October 17 1997 | Workshop - Safety versus the Environment Zeneca, Alderley Edge
Organiser: Simon Turner |
| December 1997 | Case Studies Day Loughborough University
Organiser: Ray Fearon/ Lucy Johnson |
| February/ March 1998 | Safety Deployment Computerised Systems
Location not finalised |
| May/ June 1988 | Brewing Safety Brewing Research Foundation, Reigate
Organiser: John Atherton |
| 1998 | Importance of Following up Safety Recommendations
Location and date not finalised. |
| 1998 | External Safety and Environment Auditing
Location and date not finalised |

For information about any of these meetings, please contact the Subject Group Chairman:

Simon Turner, Foster Wheeler Energy in Reading

Phone: 01734 396 048 • Fax: 01734 396 333 • E-mail: Simon-Turner@fvc.com.uk

***NOW, HERE’S YOUR CHANCE
TO OWN A WINE COOLER
THAT’S DIFFERENT!***

What could be more appropriate to grace the dining table of a chemical engineer, than a wine cooler in the shape of a natural draught cooling tower?

Hand thrown in water-absorbent terracotta, this will keep your wine bottle cool by exactly the same unit operation as the real thing – evaporative cooling!

Designed by former Yorkshire Branch Chairman, Tony Finn, this special edition piece carries a Jubilee commemorative logo. The cost to you? Just £19.95 including VAT, post and packing. **All profits will go to the IChemE Benevolent Fund.** The first 200 orders received before December 1st will be dispatched in time for Christmas. Orders (sorry, UK only) with cheque made payable to IChemE, or credit card details please, to:

Zoë Spencer, Jubilee Wine Cooler Offer, The Institution of Chemical Engineers, Davis Building, 165-189, Railway Terrace, Rugby, CV21 3HQ.

Telephone: 01788-578214 Fax: 01788-560833



EUROPEAN PROCESS SAFETY CENTRE

WHAT IS THE CENTRE?

The EPSC is an international industry-funded organisation which exists to provide an independent technical focus for process safety in Europe.

The Centre's various committees and bodies provide a forum where individuals from the member companies get together to tackle specific issues of general industry concern which could not be tackled by any one company alone.

The members of the Centre are process industry companies operating in Europe; they cover a range of types of product, size of company and geographical base. Smaller organisations and academic establishments are involved through associate membership.

WHAT DOES THE CENTRE DO?

The Centre has four objectives:

- The provision of information to the member companies;
- Involvement in the development of European legislation;
- Coordination of research work; and
- Involvement in safety education and training.

Full information on the Centre's objectives and activities are given in our Information Pack: if any Subject Group member would like a copy, please call Derryn Rolfe at EPSC HQ on: tel +44 (0)1788 534409; fax +44 (0)1788 551542; e-mail drolfe-epsc@icheme.org.uk

CURRENT ACTIVITIES

The following gives a flavour of our current activities; more projects are under development, and there is not sufficient room to report on everything we are doing.

NEW PRISM NETWORK

This is a new joint initiative between EPSC and CEFIC's SUSTECH activity. PRISM is the *Process Industries Safety Management* network, and it will provide programmes and activities to help the industry to significantly improve its personnel safety performance. Four Working Groups will address issues such as achieving a commonality of data reporting, information systems, research, and education and training in this important field. The network will be open to non-EPSC member companies - more information available from Derryn Rolfe at HQ.

FORTHCOMING CONFERENCE

The European Commission has invited EPSC to collaborate on its annual conference, which this year will be on *Lessons Learnt from Accidents*. Presentations are being given by EPSC members and the competent authorities. The conference is on 16-17 October 1997 in Linz, Austria, and attendance is by invitation only. Contact Derryn Rolfe at HQ for further details.

TECHNICAL GROUPS

The Centre's technical activities are currently focusing on safety management systems, mitigation of gas dispersion, fire protection of pressurised LPG storage and prevention of BLEVEs, safety-related failure frequencies, and incident data reporting systems.

Input to developing legislation and guidance is being made in the areas of inspection systems, land use planning, and pipelines.

UNDERGRADUATE SAFETY EDUCATION

Work on a new project in this area is underway, starting with collecting information on what safety is taught in chemical engineering degree courses across Europe. Any help academic members of the Subject Group can give would be much appreciated.

NEW EPSC PUBLICATIONS

Some EPSC information is made available outside the membership. Newly-available

Reports include *Knowledge-based HAZOPs and Risk-based inspection of ageing process plant.*

Publications already available include the books *Safety Management Systems* and *Safety Performance Measurement* and the Reports *The Basis for Safety Distances and Building Resilience, Use of Part Incident Data, and Overview of Safety-Critical Systems.*

Full details and copies available from HQ.

*Derryn Rolfe,
Manager EPSC Operations*

MAINTENANCE REPORTING

Below are some actual maintenance complaints submitted by us Air Force pilots and the replies from the maintenance crews. Squawks" are problem listings that pilots generally leave for maintenance crews.

Problem: Left inside main tire almost needs a replacement."

Solution: Almost replaced left inside main tire."

Problem: Test flight OK, except autoland very rough."

Solution: Autoland not installed on this aircraft."

Problem #1: #2 Propeller seeping prop fluid."

Solution #1: #2 Propeller seepage normal."

Problem #2: "#1, #3, and #4 propellers lack normal seepage."

Problem: The autopilot doesn't."
Signed off: IT DOES NOW."

Problem: Something loose in cockpit."
Solution: Something tightened in cockpit."

Problem: Evidence of hydraulic leak on right main landing gear."
Solution: Evidence removed."

Problem: DME volume unbelievably loud."
Solution: Volume set to more believable level."

Problem: Dead bugs on windshield."
Solution: Live bugs on or der."

Problem: Autopilot in altitude hold mode produces a 200 fpm descent."
Solution: Cannot reproduce problem on ground."

Problem: IFF inoperative."
Solution: IFF inoperative in OFF mode."

Problem: Friction locks cause throttle levers to stick."
Solution: That's what they're there for."

Problem: Number three engine missing."
Solution: Engine found on right wing after brief search."

*Communicated by Gordon Baxter -
Department Psychology,
University of Nottingham*

CHEMICAL REACTION HAZARDS,

SECOND EDITION

EDITED BY JOHN BARTON AND RICHARD ROGERS

IChemE, 1997, 225 pp, £35.00, ISBN 0 85295 3410

Shortly after the publication of the first edition of "Chemical Reaction Hazards" I wrote in October 1993

"There are some deficiencies, one of which is the lack of a nomenclature section. There are also few examples and, on detailed reactor design and optimisation, relief system sizing or dump tank design, none at all. For these skills you will need to turn to other textbooks, continuing education courses or specialist consultants. Nonetheless this is a book well worth purchasing."

The main chapter headings and content remain essentially unchanged:

- Introduction
- Process assessment and process definition
- Techniques for evaluating chemical reaction hazards
- Interpreting data with respect to process operation and plant design
- Process risk analysis
- Selecting and specifying a basis of safety
- General hazards of plant operation
- Operating procedures and instructions

Updating of content and references has been made but this is rather patchy and changes are few.

Some of the errors in the original edition have been corrected but others remain. Symbols are defined in the text but no units are given and the lack of a single nomenclature section still leaves the reader unclear why, for instance, adiabatic temperature rise is claimed to be equal to heat of reaction divided by the product of the specific heat of the reaction mixture and the mass of reactants. Do the authors

really mean that adiabatic temperature rise falls as mass of reactants increases, see pages 6 and 23?

References continue to be listed in order of citation. A more user friendly method such as the Harvard system, i.e. Barton and Nolan (1997), would be an improvement.

The new features of this second edition are appendices 1, 2 and 6. The first of these contains brief details (e.g. typically a 100 to 200 word description, but in about 10 cases a significantly longer section) on 100 case histories these being grouped and cross referenced to sections of the main body of the text. This emphasises to the reader that reaction hazards and accidents in industry are real and not a subject of academic study alone. (Latest HSE statistics on reported incidents in batch and semi-batch reactors indicate that in the UK a thermal runaway occurs every 2 weeks!)

Appendix 2 is a good and useful 10 page example of a chemical hazard assessment on the reaction between paraformaldehyde and a mixture of glycols in the presence of an acid catalyst.

Appendix 6 is another case study - from 1386. Do we learn from the errors of our ways?

All in all, the changes in the second edition are welcome even though they have not gone as far as might reasonably have been expected.

S P Waldram - July 1997
Technical Director,
Hazard Evaluation Laboratory Ltd

(First published in Process Safety and Environmental Protection and reproduced with their permission).

BRAIN TEASER

We said that we thought that the last brain teaser" was fairly straightforward, but not quite as trivial as it looked. Despite this only two readers provided correct answers. David Graham, having been a previous runner up, wins our prize of free registration at one of the subject group's one-day meetings.

The brain teaser" was posed as follows:

A man with a house on a stretch of tidal river occasionally uses a boat equipped with an outboard motor to visit a nearby riverside pub. The pub is two kilometres away and the man finds that with the current the trip takes two minutes. When he makes a return trip against the same current the trip takes four minutes. How long will it take to make the trip at slack water when no current is running?

The correct answer is two minutes and 40 seconds.

BOOK REVIEW

FOR THE S&LP SUBJECT GROUP NEWSLETTER

Book: *The Hazards of Life and all that'*

Author: *John Bond*

ISBN: *0750303603 Institute of Physics Publishing; Bristol and Philadelphia, 1996*

Price: *£15.00*

How often have you sought an amusing phase for a safety presentation? How many of you have plucked the flower safety from the bard's thorns, and wanted something fresher? Is your book of quotations no longer of any use to you? Never fear, the solution is here!

John Bond's recent book 'The Hazards of Life and all that', is a valuable compendium of interesting accidents and historical facts that could be used to enliven safety presentations. For instance, did you know that 'Mary the Jewess', an Egyptian alchemist of the early Christian era, was the first female chemical engineer? John's book reveals that she invented the 'Bain Marie' used in cooking, and that she also developed crude oil distillation.

The book has eighteen chapters, each covering a topic related to safety or its history. Chapter sixteen is entitled 'Quotes', and includes several versions of Murphy's Law as a finale to a variety of amusing safety quotations. However, all of the other chapters contain useful and amusing antidotes, quotations, poems and curiosities suitable for safety presentations.

The concluding chapter, entitled 'Janus' ruminates on the failure of humanity to learn from safety lessons.

The book, is illustrated by Keith Jenkins, who has drawn cartoons to accentuate messages in the text. His caricature of John embellishes the book cover.

This book is a must for all safety practitioners, and a good buy at only £15.00.

John Gillett, Zeneca

SCHEDULE OF MEETINGS/COURSES ON SAFETY RELATED TOPICS

Topic/Title	Date/ Duration	Venue	Contact Person/ Phone/Fax/Address
Legislation Changes for Hazardous Area Equipment	14.10.97 1 day	Kent	Tel: 0181 467 2636 Fax: 0181 295 3005
Static Electricity	15.10.97 1 day	Kent	Tel: 0181 467 2636 Fax: 0181 295 3005
Explosion Prediction and Mitigation	10.11.97 3 days	Leeds	Julie Charlton Dept of Fuel and Energy University of Leeds Tel: 0113 233 2494 Fax: 0113 233 2511
Engineering for Hazard Reduction - a Regulators Perspective	29.10.97 1 day	London	The Hazards Forum 1 Great George Street London SW1P 3AA Tel: 0171 665 2158 Fax: 0171 233 1806
Behaviour of Polymeric Materials in Forces	15.10.97 3 days	Leeds	Julie Charlton Dept of Fuel and Energy University of Leeds Tel: 0113 233 2494 Fax: 0113 233 2511
Fire Safety Management	25.01.97 6 days	Borhamwood	May Hill Sseyin Training Administrator LPC Melrose Avenue, Borehamwood Herts WD6 2BJ
Process Safety - European Update	20.10.97 2 days	London	IBC Technical Services 57-61 Mortimer Street London W1N 8JX Tel: 0171 637 4383 Fax: 0171 631 3214
Hazardous Area Classification	13.10.97 1 day	Kent	Tel: 0181 467 2636 Fax: 0181 295 3005
Risk Based Management in the Oil and Gas Industry	01.10.97 2 days	Aberdeen	Aberdeen Centre Tel: 0161 228 7824 Fax: 0161 236 6977
Investigation, Analysis and Reporting of Accidents and Incidents	02.10.97 2 days	London	Pam Keeling, IChemE Tel: 01788 578 214 Fax: 01788 560 833
Incident Reporting - IChemE Training Package	15.10.97 1 day	Hull	Eddie Kelsall Tel: 01472 253 386
Assessment and Control of Electrostatic Hazards in Industry	15.10.97 1 day	Leeds	Ross Hall Tel: 01943 817 666
COSHH and its Assessments	21.10.97 2 days	Derby	Katrina Williamson Tel: 01332 677 066
5th Annual Integrated Hazard Assessment Course	03.11.97 5 days	Chester	Peter Doran Tel: 01606 889 714 Fax: 01606 889 714
Hazop Study for Team Leaders and Team Members	04.11.97 4 days	Manchester	Pam Keeling Tel: 01788 578 214 e-m: pkeeling@icheme.org.uk
Safety Auditing	11.11.97 2 days	Derby	Katrina Williamson Tel: 01332 677 077 Fax: 01332 679 609
Process Plant Reliability and Maintainability	01.12.97 4 days	Sheffield	Pam Keeling Tel: 01788 578 214 e-m: pkeeling@icheme.org.uk
Management of Fire and Explosion	08.12.97 2 days	London	Anne Lomex Tel: 0171 973 1261

