Contents

Plenary session 1

Paper 1 Making process safety a topic for the board room
Page 1 G. Ellis (ABB Consulting, UK)

Paper 2 Field implementation of the COMAH competent authority strategic priority on ageing plant
Page 8 S. Pointer (Health and Safety Executive, UK)

Learning from incidents (parallel session 2)

Paper 3 Learning lessons from incidents: a paradigm shift is overdue
Page 15 S. Mannan (Mary Kay O'Connor Process Safety Center, USA) and S. Waldram (Mary Kay O'Connor Process Safety Center and Waldram Consultants Limited, USA)

Paper 4 Managing emergencies; the establishment of a competent response
Page 21 D. Evans (Petrofac Training Services, UK) and E. Gittenberger (Skills XP, UK)

Paper 5 Performance indicators for major accidents – lessons from incident analysis

Paper 6 Identifying the causes of hydrocarbon releases on offshore platforms
Page 33 J. Gilroy, D. Dumolo and D. Porter (LR Scandpower Ltd., UK)

Process safety research (parallel session 3)

Paper 7 Recent progress in LNG safety and spill emergency response research
Page 39 B.K. Kim, R. Ruiz, B. Zhang, S. Nayak, R.A. Mentzer and M.S. Mannan (Mary Kay O'Connor Process Safety Center, USA)

Paper 8 Experimental investigation on the self-heating and decomposition of tetrafluoroethylene in a 100-dm³-reactor
Page 48 R. Zeps, F. Ferrero, M. Beckmann-Kluge, V. Shroder (BAM Federal Institute for Materials Research and Testing, Germany) and T. Spoormaker (PlasticsEurope Fluropolymers TFE Safety Taskforce, The Netherlands)

Paper 9 HSL – INERIS vent sizing round robin exercise on 40% di-cumyl peroxide in di-isobutyrate solution
Page 56 J.-L. Gustin, D. Alix and Y. Couturier (Rhodia Research and Technologies, France)

Dust explosions (parallel session 4)

Paper 10 New engineering guideline (VDI 2263 Part 7) on dust fires and explosions protection in spray drying and integrated equipment
Page 64 N. Jaeger (Syngenta Crop Protection Münchwilen AG, Switzerland)

Paper 11 Exploding corn
Page 71 P.J. Caine and G.P. Ackroyd (Syngenta Process Hazards Section, UK)

Paper 12 Explosion properties of admixtures
Page 77 W. Rattigan and P. Holbrow (Health and Safety Laboratory, UK)

Paper 13 Explosibility of nontraditional dusts: experimental and modeling challenges
Page 83 P. Amyotte (Dalhousie University, Canada), F. Khan (Memorial University, Canada), S. Boilard (Dalhousie University, Canada), I. Iarossi (Dalhousie University, Canada and Politecnico di Torino, Italy), C. Clooney (Dalhousie University, Canada and Martec, Lloyd's Register, Canada), A. Dastidar (Fauske & Associates, USA), R. Eckhoff (University of Bergen, Norway), L. Marmo (Politecnico di Torino, Italy) and R. Ripley (Martec, Lloyd's Register, Canada)
Operations and maintenance I (parallel session 5)

Paper 14  A Benchmarking study on asset integrity and the issues of ageing plant in the UK chemicals industry
Page 91  J. Hought and A. Fowler (HFL Risk Services, UK)

Paper 15  Operator alarms are the first line of defence

Paper 16  Pass it on! Revisiting shift handover after Buncefield
Page 108  J. Wilkinson and R. Lardner (The Keil Centre, UK)

Paper 17  Addressing work execution is key to improving day to day operational risk management and enhancing process safety management
Page 117  P. Murray and S. Lehmann (Petrotechnics, UK)

Paper 18  Complacency as a casual factor in accidents – fact or fallacy?
Page 127  G. Innes-Jones (LR Scandpower, UK)

New energy landscape I (parallel session 6)

Paper 19  CCS CO2 risk management – new industry guidance
Page 133  H. Holt (DNV KEMA, UK), K. Helle and J. Brown (DNV KEMA, Norway)

Paper 20  Experimental studies of the behaviour of pressurised releases of carbon dioxide

Paper 21  Validation of dispersion models for high pressure carbon dioxide releases
Page 153  C.M. Dixon (Shell Global Solutions, UK), S.E. Gant (Health and Safety Laboratory, UK), C. Obiorah (Shell Global Solutions International, The Netherlands) and M. Bilio (Health and Safety Executive, UK)

Paper 22  Experimental investigation of high pressure liquid CO2 release behaviour
Page 164  M. Pursell (Health and Safety Laboratory, UK)

Paper 23  Phast validation of discharge and atmospheric dispersion for pressurised carbon dioxide releases

Hazards and risk (parallel session 7)

Paper 24  HAZOP and LOPA the odd couple
Page 183  C. Fane de Salis (Rowan House Ltd., UK)

Paper 25  A systematic approach to addressing human factors issues for SIL determination studies
Page 187  D. Embrey (Human Reliability Associates, UK) and M. Raj (Optimus Aberdeen Ltd., UK)

Paper 26  An independent evaluation of the UK Process Industry Gap Analysis Tool for addressing the uses of an operator as SIL level 1 component in tank overfill protection systems
Page 198  D. Embrey and J. Henderson (Human Reliability Associates, UK)

Paper 27  The work of the European Process Safety Centre (EPSC) Technical Steering Committee Working Group: 'atypical scenarios'
Page 205  R. Gowland (EPSC, UK)

Paper 28  A simple methodology to assess environmental risk from offshore operations
Page 207  M. Celnick and B. Bain (Det Norske Veritas Limited, UK)

Paper 29  Beyond LOPA: Safety integrity assessment in the pharmaceutical sector
Page 215  A.G. King (ABB Consulting, UK) and D. Hodgson (Shasun Pharma Solutions, UK)
Process safety management (parallel session 8)

Paper 30  Developing a benchmarking service for the HSL Safety Climate Tool  
N. Healey, C. Sugden, S. Binch, C. Lekka (Health and Safety Laboratory, UK) and D. Bottomley (Merlin Analytical Service, UK)

Page 222

Paper 31  Where do procedures sit within a competence management system?  
R. Selfe, S. Watson, A. Sheridan and J. Berman (Greenstreet Berman Ltd., UK)

Page 230

Paper 32  Preparing graduates for the real safety world – the past and the future  
F.K. Crawley and B.R. Dickson (University of Strathclyde, UK)

Page 236

Paper 33  Is it time, in the process industry, to question the limits of audits?  
J.C. Le Coze and M. Dupré (Imesis, France)

Page 244

Paper 34  A method for project safety design verification across a global organisation  
J. Martin and C. Flower (ABB Consulting, UK)

Page 255

Paper 35  Process safety management audits – lessons learnt from South Africa  
R. Prior (SHEXcellence cc, South Africa)

Page 261

Consequence assessment I (parallel session 9)

Paper 36  Calculating toxic impacts to indoor populations  
A.G. Sarrack (Baker Engineering and Risk Consultants, Inc., USA)

Page 267

Paper 37  Progressive analysis of control room vulnerability  
S. Ward (Baker Risk Europe Ltd., UK), D. Bogosian and A. Christiansen (Baker Risk, USA)

Page 273

Paper 38  Case studies illustrate the benefits of simulation modeling  
D. Maggi (Arthur D Little Spa., Italy), A. Vernia (Arthur D Little Ltd., UK) and G. Stevens (Risk Simulation Ltd., UK)

Page 281

Paper 39  Modelling the vaporization of cryogenic liquid spilled on the ground considering different boiling phenomena  
Y. Liu, X. Gao (Mary Kay O’Connor Process Safety Center, USA), T. Olewski, L. Vechot (Texas A&M University at Qatar, Qatar) and M.S. Mannan (Mary Kay O’Connor Process Safety Center, USA)

Page 289

Paper 40  Key factors for the estimation of cross-country pipelines failure rates  
G. Pettitt (Environmental Resources Management, UK)

Page 297

Paper 41  Presenting the societal risk of pipelines transporting hazardous materials  
U. Neunert and K.-D. Kaufmann (ILF Consulting Engineers, Germany)

Page 307

Gas and vapour flammability (parallel session 10)

Paper 42  Mitigation of vapour cloud explosions by chemical inhibition  
D. Roosendans (Vrije Universiteit Brussel, Belgium), P. Hoorelbeke (Total, Belgium) and K. van Wingerden (GexCon AS, Norway)

Page 313

Paper 43  Generation of flammable mists from high flashpoint fluids: literature review  
S. Gant, R. Bettis, R. Santon (Health and Safety Laboratory, UK), I. Buckland (Health and Safety Executive, UK), P. Bowen and P. Kay (Cardiff University, UK)

Page 327

Paper 44  New methods for hazardous area classification for explosive gas atmospheres  
R. Santon, M. Ivings, D. Webber and A. Kelsey (Health and Safety Laboratory, UK)

Page 339

Paper 45  Hazards of accelerated gas explosion venting and their safety-relevant parameters  
M. Poli, R. Grätz and V. Schröder (BAM Federal Institute for Materials Research and Testing, Germany)

Page 347
Paper 46  Ignition hazards and area classification of hydrocarbon cold vents by the offshore oil
and gas industry
A.K. Pemberton, A.M. Thyer (Health and Safety Executive, UK) and H.S. Ledin (Health
and Safety Laboratory, UK)

Paper 47  Practical application of the UKOOA Ignition Model
B. Bain, M. Celnik and G. Korneliussen (Det Norske Veritas Limited, UK)

**Legislation and compliance (parallel session 11)**

Paper 48  An alternative methodology addressing United Nations (UN) classification type for
self-reactive substances
D. Dale (SciMed/Fauske and Associates, UK)

Paper 49  The forthcoming Seveso III Directive: alignment with GHS classifications and data issues
for acute toxicity
J. Wilday, S. Fraser, C. Bailey, M. Stocks-Greaves (Health and Safety Laboratory, UK),
P. Ridgway and S. Ashcroft (Health and Safety Executive, UK)

Paper 50  Using process safety peer review to identify best practices – a case study
G. Sellers (Safety Management Consultant/committee member of IOSH Hazardous
Industries Group, UK), B. Woodhouse (National Grid, UK) and C. Conlon
(National Grid, USA)

Paper 51  How reliable is my safety case?
K.R. Murphy (AWE, UK), S.M. Gilbert (Rockbourne Limited, UK) and B. Lewis
(Partnership Plus Limited, UK)

Paper 52  Integration of ALARP into project management processes – how low is low enough?
C.A.L. Nicholls (RAS Ltd., UK)

**Operations and maintenance II (parallel session 12)**

Paper 53  Extending the hazard register
M. Phillips

Paper 54  Essential process safety management for managing multiple oil and gas assets
J. Hopkins (Wood Group Engineering Ltd., UK)

Paper 55  Using oil & gas emergency response training to help ensure the understanding of the
major hazards of hydrocarbon industries
D.R. Charlton and J.W. Sinclair (Darcy Management Ltd., UK)

Paper 56  The importance of recognising and managing ageing plant
D. Mansfield, T. Atkinson and J. Worsley (ESR Technology, UK)

Paper 57  Permits around the world
R. Barrett and D. Scott (Charles Taylor Technical – CTT, UK)

**Consequence assessment II (parallel session 13)**

Paper 58  Proper application of flammability limit data in consequence studies
J.R. Rowley and J.E. Bruce-Black (Baker Engineering and Risk Consultants, Inc., USA)

Paper 59  Effects of constraints on gas flow on the severity of vapour cloud explosions
G. Atkinson (Health and Safety Laboratory, UK)

Paper 60  Dealing with the complexities of coincident flaring hazards in expanding offshore facilities
C. Crowley (Atkins Ltd., UK)

Paper 61  An integral model for pool spreading, vaporisation and dissolution of hydrocarbon mixtures
M.I. Fernandez, M. Harper (DNV Software, UK), H. Mahgerefteh (University College
London, UK) and H.W.M. Witlox (DNV Software, UK)
Paper 62 Comparative study of models used in the estimation of risk from flash fire events at major hazard installations
D. Lisbona (Health and Safety Laboratory, UK), B. Briggs (Hazardous Installations Directorate CI5, UK) and M. Wardman (Health and Safety Laboratory, UK)

Paper 63 Advanced hybrid modelling of separators for safe design in oil/gas production plants
J. Marriot (Process Systems Enterprise Ltd., UK)

New energy landscape II (parallel session 14)

Paper 64 Future energy technology – thermal hazards of Li-ion batteries
J. Singh (HEL Ltd., UK)

Paper 65 Experimental releases of liquid hydrogen
P. Hooker, D.B. Willoughby, J. Hall (Health and Safety Laboratory, UK) and M. Royle (Health and Safety Executive, UK)

Paper 66 Ensuring an adequate separation distance between wind turbines and buried energy infrastructure
N. Jackson (National Grid, UK), P. Baldwin (GL Noble Denton, UK), and B. Andrews (MACAW Engineering, UK)

Paper 67 Lessons for safe design and operation of anaerobic digesters
A. Jenkins (Zebec Biogas, UK), L. Gornall (PROJEN BioEnergy, UK) and H. Cripps (HRC Consultants, UK)

Paper 68 Probabilistic risk assessment in combination with CFD modelling of biomass dust explosions within large bulk storage volumes
C.J. Coffey and D.W. Price (Gexcon UK Ltd., UK)

Process safety management (parallel session 15)

Paper 69 Organisational and cultural causes of accidents – a pilot study
M. McBride (Centrica plc, UK), R. Taylor (University of Bristol, UK) and G. Sibbick (Centrica plc, UK)

Paper 70 Safety culture and performance indicators for a 'top tier' COMAH SME
D.P. Threlfall (Roxel (UK Rocket Motors), UK)

Paper 71 Developing a process safety climate tool: the long and winding road
S. Binch, C. Sugden, N. Healey, C. Butler and C. Lekka (Health and Safety Laboratory, UK)

Paper 72 Working towards high reliability: a qualitative evaluation
C. Lekka and C. Sugden (Health and Safety Laboratory, UK)

Paper 73 Process safety leadership is the key to successful PSM implementation both in the UK and on a global scale
S. Grindrod and A. Fowler (HFL Risk Services, UK)

Plenary session 16

Paper 74 Vapour cloud explosion at the IOC terminal in Jaipur
D.M. Johnson (GL Noble Denton, UK)

Paper 75 Corporate governance for process safety
M. Hailwood (OECD Working Group on Chemical Accidents and LUBW State Institute for Environment Monitoring and Nature Conservation Baden-Württemberg, Germany), I. Travers, A. Cockton (Health and Safety Executive, UK), J. Oh and J. Brouwer (Ministry of Social Affairs and Employment, The Netherlands)

Paper 76 28 years after Bhopal – important things that catastrophic events teach us
S. Berger and L. Nara (Center for Chemical Process Safety (CCPS), AIChE, USA)