Fire and Explosion Investigation
Monday 1 – Friday 5 October 2018

PROGRAMME

Course Directors: Dr Roth Phylaktou and Professor Gordon Andrews

MONDAY 1 OCTOBER 2018
Principles of Fire Investigation with Case Studies

Course Chair: Dr Roth Phylaktou

08.30  Registration
09.00  Introduction
       Dr Roth Phylaktou, University of Leeds
09.15  Legal implications of fire investigation
       Dave Winspear, Fire Investigation Officer
10.15  Coffee
10.30  Management of fire investigation and collection of information
       Deductive evidence at the scene, locating seats of fire and witness statements
       Graham Saward, Consultant and Paula Saward, Consultant
12.30  Lunch
13.15  The effects of fire fighting operations on fire investigations
       Dave Winspear, Fire Investigation Officer
       An overview of the effects fire-fighting operations can have on fire investigation and how firefighters can assist in preserving the scene. Also discussed will be tools that assist fire investigation including vehicle CCTV and an in-depth case study of the Castleford cable theft explosion.
14.15  Heat transfer, ignition and flame spread
       Dr Roth Phylaktou, University of Leeds
       Heat transfer processes and their significance, ignition of solids; minimum ignition flux; factors influencing rate of spread; relative flame spread rates; Liquid fuels; Solid fuels: orientation and direction of propagation; density, thermal capacity and thermal conductivity; sample geometry; environmental effects. Implications for fire origin determination.
15.15  Tea
15.30  Burning rates, fire plumes
       Dr Roth Phylaktou, University of Leeds
       Mass burning rate, flame extent and geometry, flame length, flame tilt, flame drag. Case studies. Example calculations; rate of heat release from a pool fire, flame length Radiative heat transfer.
17.00  End of day one

TUESDAY 2 OCTOBER 2018
Fire Science and Engineering Fundamentals

Course Chair: Professor Gordon Andrews

08.45  Registration
09.00  Electrical fires
       Dr Peter Jowett, Dr J H Burgoyne and Partners
       An overview of electrical causes of fires with case studies
10.00  Coffee
10.15  Fire investigation case studies – lessons learned
       Professor David Purser, Hartford Environmental Research
       Understanding fire origin, fire spread and fire hazards through fire incident investigations.
11.30  Forensic pathology as an aide to fire investigation
       Professor David Purser, Hartford Environmental Research
       Fire deaths have been analysed in terms of victim characterisation, evidence of drugs and alcohol and % carboxyhaemoglobin in the blood. The latter has been investigated in relation to the fire profile.
### TUESDAY 2 OCTOBER 2018 continued...

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<td>12.45</td>
<td>Lunch</td>
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<td>13.30</td>
<td><strong>Compartment fires</strong></td>
<td>Dr Roth Phylaktou, University of Leeds</td>
<td>Influence of compartmentation and ventilation. Growth period, Flashover, fully developed fire, fire severity and fire resistance, backdraught. Interaction with detection and suppression systems. Time based fire growth calculations.</td>
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<td>15.00</td>
<td><strong>Stoichiometry, passive fire protection and air supply, fire load, estimation of fire heat release</strong></td>
<td>Professor Gordon Andrews, University of Leeds</td>
<td>Fire stoichiometry, flammability limits, methods of extinguishing flames. Fire load and heat release. Air supply to fires and maximum fire duration from stoichiometry considerations.</td>
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<td>16.30</td>
<td><strong>Laboratory analytical techniques for the detection of accelerants used in arson fires</strong></td>
<td>Professor Gordon Andrews, University of Leeds</td>
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### WEDNESDAY 3 OCTOBER 2018

**Post Fire Data Analysis and Modelling and its use in Fire Protection**

**Course Chairs:** Dr Roth Phylaktou

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<td>09.00</td>
<td><strong>Fire investigation as a source of data for safety design</strong></td>
<td>Ahmed Maani, Arup Fire</td>
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<td>10.30</td>
<td><strong>Fire investigation as a source of data for safety design continued...</strong></td>
<td>David Crowder, BRE Global</td>
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<td>13.00</td>
<td><strong>Fire modelling in support of fire investigation with case studies</strong></td>
<td>David Crowder, BRE Global</td>
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<td>14.15</td>
<td><strong>Fire Investigation scenario tutorial</strong></td>
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<td>Includes an analysis of some of the issues relating to the Grenfell Tower fire</td>
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<td>Tea</td>
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<td>15.30</td>
<td><strong>Fire Investigation scenario tutorial (continued)</strong></td>
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<td>Includes an analysis of some of the issues relating to the Grenfell Tower fire</td>
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### THURSDAY 4 OCTOBER 2018

**Specialist Fires**

**Course Chair:** Professor Gordon Andrews

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<td>09.00</td>
<td><strong>Fire and explosion experience in industrial and commercial fires</strong></td>
<td>Professor Gordon Andrews, University of Leeds</td>
<td>A number of incidents will be shown outlining the principal hazards involved and some of the positive fire risk management measures adopted.</td>
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THURSDAY 4 OCTOBER 2018 continued...

10.15 Vehicle Fire Investigation  
Dr Charles Gardner, Dr J H Burgoyn and Partners  
An overview of fires in vehicles with case studies and research showing the thermal properties of a vehicle fire.

11.15 The Interaction of insurance with fire investigation  
Russell Kirby, FM Global  

12.30 Lunch

13.15 Spontaneous ignition  
Professor Gordon Andrews, University of Leeds  
Sudden inflammation of bulk materials in the absence of an external heat source, storage hazards. Incidents involving spontaneous ignition will be described.

14.15 Hickson and Welch fire and other case studies  
Dr Ken Patterson, Ken Patterson Process Safety  
The investigation into the causes of two major fires will be described, with a discussion of both the technical findings and the consequences for the companies involved.

15.45 Tea  
16.00 Vapour/gas explosion fundamentals with case studies including fuel tank vapour explosions  
Professor Gordon Andrews, University of Leeds  

FRIDAY 5 OCTOBER 2018  
Explosion Investigation

Course Director: Dr Roth Phylaktou AM

08.45 Registration

09.00 Types of explosions  
Dr Charles Gardner, Dr J H Burgoyn and Partners  
Similarities and differences, damage patterns, tnt equivalency, missile generation, injuries

10.30 Coffee

10.45 Bleves  
Professor Geoff Chamberlain, Waverton Consultancy Ltd, previously Shell Global Solutions (UK)

11.30 Hazardous Area Classification - principles and pitfalls  
Steve Sherwen, RPS Risk Management  
An overview of Hazardous Area Classification, explaining its purpose and its role in preventing fire and explosions. The importance of correct equipment specification and the control of work in hazardous zones will also be discussed with case studies where controls have failed.

12.30 Lunch

13.15 Explosion investigation incidents  
Gary Tomlin, DNV GL

14.15 Electrostatic ignition hazards  
Dr Jeremy Smallwood, Electrostatic Solutions Ltd  
An overview of: the mechanisms of charge generation and accumulation; the types of electrostatic discharges and their igniting power; the general precautions necessary to avoid the hazards.

15.15 Tea

15.30 Explosion investigation: estimation of overpressures from injuries and structural damage  
Dr Roth Phylaktou, University of Leeds

16.30 End of day five and course