Conference Chairmen

Conference Stream 1 - Carriage Suite

Ron Sinclair MBE – Chair of ExSFCC & SGS Baseefa Technical Manager

*SGS Baseefa Technical Manager **Ron Sinclair** MBE is chairman of BSI Committee EXL/31 and responsible for the UK input to both European and International standards for Electrical Equipment for use in potentially explosive atmospheres. He is also chairman of Cenelec TC31, represents electrical standardisation interests on the European Commission's ATEX Standing Committee and chairs the IECEx Service Facility Certification Committee.*

www.sgs.co.uk/sgsbaseefa

Conference Stream 2 - Reading Room

Martin Jones – Head of CompEx Global

***Martin Jones** manages the global operations and strategic development of the CompEx Core Competency Scheme for Electrical and Mechanical practitioners and professional Application Design Engineers who work in explosive atmospheres. His 20 years' experience as a qualified electrical craftsman and electrical engineer in British Coal Corporation in the UK, where he was legally / statutorily responsible for the safe installation, testing and maintenance of all electrical equipment at the coal mine, both surface and underground, together with 7 years managing the production of chipboard and MDF board at Europe's largest board panel manufacturer, has provided Martin with vast experience towards working safely in gas and dust atmospheres.*

www.compex.org.uk

Day one - *26/02/2020*

1. Managing the challenges that hazardous process industries are facing

Wednesday 09:30 - 10:10 – Conference Stream 1 - Carriage Suite

Steve Elliot – CEO, Chemical Industries Association

Steve Elliott *joined the Chemical Industries Association in 1997, spending four and half years as Head, International Trade with additional responsibility for Sustainable Development. In April 2002, he was promoted to the position of Director, Trade & Competitiveness and subsequently Director, Business Environment. Steve was appointed Chief Executive of the CIA in February 2006.*

Steve possesses a First-class BA (Hons) degree from Nottingham Trent University, and is an Associate Fellow of the IChemE. Prior to his career with CIA, he spent fifteen years working with the DTI, a South African trade advisory body and Crown Agents as an international trade policy and promotion specialist, as well as in general consulting with the BPI Group.

Steve currently sits on the Board of the Involvement and Participation Association (an employee relations think-tank), is a Trustee of CogentSkills, a member of the Process Safety Management Competence Board and chair of the European Chemical Industry Council (CEFIC) Communications Network. Former roles include Chair of the UK's Energy Intensive Users Group and President of the European Chemical Employers Group.

Abstract:
This presentation will focus on three key topic areas of central importance to the high hazard industries: Digitalisation and Cyber; Climate Change as a threat to hazardous inventories and processes; and Leadership.

2. The role of digitalisation in improving downstream efficiencies and safety

Wednesday 10:10 - 10:50 – Conference Stream 1 - Carriage Suite

Stephen Marcos Jones – Director-General, UKPIA

As Director-General of the UK Petroleum Industry Association (UKPIA), ***Stephen Marcos Jones*** *is responsible for the overall management and effectiveness of UKPIA as the UK's principal advocate for the downstream oil sector. With over 15 years' experience across the oil and gas industry, Stephen's leadership of UKPIA encompasses all areas of the organisation's expertise, including fuels quality, environmental regulations, advocacy and industry economics, and the future vision for the UK industry. Prior to joining UKPIA, Stephen established and led the UK upstream industry's Efficiency Task Force. He has also worked on projects for the UK Government's Department for Education and spent five years leading the communications department of a European scientific organisation in Barcelona. Stephen is a Board member of OPITO UK and Cogent, skills bodies for the energy industry.*

Abstract:
Stephen Marcos Jones will be speaking about the potential role for digital in unlocking efficiencies and improving safety in the downstream oil sector.

In a low-margin sector such as downstream oil, the need to embrace digital change that offers cost savings especially around energy efficiency and maximising yields is vital, yet it is only now that the sector is seeming to pick up on the opportunity that digitalisation offers. Mr Jones will highlight some of the existing uses that are emerging from use of digital in the downstream space – whether that be drones reducing the amount of working at height or the use of submersibles in tanks when thinking about major terminal operations, right down to the forecourt experience where consumers are already seeing a difference via the use of payment via app.

The chance to use digital technologies will continue to expand with the potential to continue to improve the safety record of the industry while also offering opportunities to de-risk commercial operations too. Join Mr Jones to hear more about the digital opportunities across the sector: discovering new ways to track our people to ensure their safety on site, using digital replicas to test the impacts of new crudes in refining to improve margins, or improving regulatory compliance through new monitoring techniques.

3. An update from HSE on cyber security under COMAH and NIS, and issues and challenges emerging from the use of AI, telecoms and interconnected devices

Wednesday 11:30 - 12:10 – Conference Stream 1 - Carriage Suite

Steve Naylor – Associate Director and Technical Lead of Discovering Safety Programme, HSE

Rhodri Morgan – Electrical Control and Cyber Security Specialist Inspector, HSE

Steve Naylor *is a Senior Scientist within HSE's Science and Research Centre, working within its Data Analytics team, and an Associate Director on the LRF Discovering Safety Programme, technically leading several projects being delivered as part of the programme.*

His specialist area of technical expertise is in the application of data analytic techniques, including data mining for knowledge discovery, text mining and natural language processing, and predictive analytic techniques, to generate intelligence from disparate multi-format data sources to inform organisational decision-making. He is passionate about the safe and ethical exploitation of emerging digital technologies to support better health and safety practice in workplaces.

Rhodri Morgan *joined the HSE in 2019 as an Electrical Control and Cyber Security Specialist Inspector in the Chemicals, Explosives and Microbiological Hazards Division. Before joining the HSE, Rhodri held various roles as a Principal Functional Safety Engineer working in engineering consultancies and suppliers of offshore and subsea equipment in the U.K. and Norway. Rhodri has worked for over twenty-five years in the process, offshore and oil and gas industries.*

Rhodri has extensive experience in the design and commissioning of control systems implemented using both hardware and software and in delivering functional safety services and managing the risks associated with technology and software development.

Abstract:

HSE will give an update on the work they have been doing in cyber security, under COMAH and NIS, issues and challenges that they are working on, plans looking ahead and emerging risks to health and safety in applications using AI, telecommunications, and some of the research in areas such as interconnected devices and IoT.

Industry 4.0 is transforming how operational decisions are arrived at in industrial workplaces. The technologies in question are enabling detailed digital snapshots of operations to be generated and subsequently used to support and even completely automate operational decision-making.

Industry 4.0 technologies introduce the concept of cyber physical systems, integrations of complex physical machinery, networked sensors and computer software, which can self-monitor and then adapt their functioning to optimise performance based on the current prevailing operational environment.

Cyber physical systems are transforming the interaction between humans, equipment and industrial processes in workplaces and such transformations are increasingly extending to how health and safety is practiced in workplaces. In fact, in some workplaces, such systems are being used directly for the purposes of better managing health and safety risks. More commonly however, they are being used more for optimising operations and delivering improvements in process efficiency, but in doing so, it is evident that new health and safety risks have the potential to be introduced into workplaces.

This presentation will provide a perspective on a number of these technological challenges, with particular reference to work being undertaken by HSE's Science Division on its Discovering Safety Research Programme.

4. IECEx: The Global Standard in Ex Certification

Wednesday 12:10 - 12:50 – Conference Stream 1 - Carriage Suite

Prof. Dr. Thorsten Arnhold – Chairman 2014-2019, IECEx

Chris Agius – Executive Secretary, IECEx

*From 2014 to 2019, Prof. Dr. **Thorsten Arnhold** was the Chairman of the IECEx Conformity Assessment System. Before this, he was the Head of the German Delegation at the IECEx Management Committee for 7 years. In 2020, after the completion of his second and last term as Chairman of IECEx, he became the German member of the IEC Conformity Assessment Board (CAB).*

Thorsten started his career as a Senior Quality Engineer at Commodore Computers. For the last 27 years he has been working for the German Manufacturer R. STAHL, an international market leading company specialising in safety technologies. His current position at R. STAHL is VP Technology. In this position, he is responsible for the research activities of the group, the development of new technologies and the coordination of the standardisation activities.

***Chris Agius** is the International Executive Secretary with CEO operational responsibilities for the International IEC Conformity Assessment System for Ex equipment, IECEx and the IECQ. He has held the IECEx Executive Secretary position since the IECEx System began more than 20 years ago through to present day where IECEx has achieved formal endorsement by the United Nations via the UNECE.*

Chris has a longstanding involvement in the development of National and International Standards and Certification systems and has held various key positions in the Standards Australia Group. He is a member of various International ISO CASCO Expert Working Groups dealing with International Standards on Conformity Assessment and a recipient of the prestigious "HazardEx Life-Time Achievement Award" for contributions to the industry.

Abstract:

It has been more than 20 years since the first IECEx report or Certificate was issued and since those humble beginnings, IECEx has evolved into the "Global Standard", accepted by industry and Governments when conducting testing and certification of Ex-related Equipment, Services and Competence in the many industries where flammable and combustible materials are extracted, processed, stored and used.

While formally endorsed in 2011 by the United Nations UNECE, via its "Common Regulatory Objective" publication, as world's best practise and recommended model for regulating in the Ex areas, this endorsement has been re-enforced in 2019.

This presentation will provide an update of the current IECEx Certification Tools that facilitate world trade in Ex equipment, assemblies and services and how IECEx can also be used to bridge between differing national regulations through its "Fast Track" provisions. The newly launched and re-engineered IECEx "On-Line Certificate System" will also be demonstrated.

5. Risk management in explosive ordnance disposal

Wednesday 14:00 - 14:40 – Conference Stream 1 - Carriage Suite

Colin King – Technical Director, Fenix Insight

Colin King *served as a bomb disposal officer in the British Army, with operational tours including the Falklands, Gulf, Bosnia and Kosovo. He instructed at the British EOD School and spent many years in military intelligence, also leading the first British team to train Afghan deminers before his final tour with the Gurkhas. He is now the technical director of Fenix Insight Ltd, with tasks including the disassembly and analysis of live munitions in conflict zones throughout the world. Colin also writes the leading technical reference work on EOD for Jane's Information Group.*

Abstract:
Explosive Ordnance Disposal (EOD) expert Colin King, a former British Army engineer and bomb disposal trainer, will discuss how he manages the many varied risks associated with going about his daily business.

Colin confesses that he is far from an expert in risk management. However, with more than thirty years in EOD and with all major appendages still attached, he can at least claim some practical experience. His background, coupled with a relatively recent introduction to a formalised approach, offers a slightly unusual perspective on the nature of risk.

Colin has become increasingly aware that risk, and its treatment, are remarkably similar across many industries, and many Hazardex attendees will identify parallels with their worlds. Well-established principles, such as the link between risk and opportunity, and the fact that the treatment of one risk often gives rise to another, are equally valid.

The gap between the perception of risk and the reality is probably wider in EOD than in comparable sectors, resulting in intense scrutiny on the rare-but-sensational at the expense of the likely-but-dull. Because of this, intuitive decisions are often flawed, hence the need for evidence to support key decisions. In the world of EOD, where that evidence is not readily available, Colin and his team have to be prepared to go looking for it.

6. Further down the rabbit hole – detailed measurement for lead process indicators on barrier failures

Wednesday 14:40 - 15:20 – Conference Stream 1 - Carriage Suite

Dr. Zsuzsanna Gyenes – Deputy to the Director, IChemE Safety Centre

After graduating with a Master of Science in Biochemical Engineering from the Technical University of Budapest, Dr. ***Zsuzsanna Gyenes*** *worked in disaster management for the Hungarian Government. During this time, she obtained a Postgraduate Diploma in Environmental Public Administration. She then moved into a role as a Seveso Site Inspector for Hungary, at this time she also obtained her PhD cum laude on the development of procedures and tools for the improvement of industrial safety against external effects from the National Defence PhD Institution in Military Technology in Hungary.*

Following her time as a Seveso Inspector, she was the Head of Section for Nuclear Safety in the National Directorate General for Disaster Management in Budapest. Her most recent role was as a Scientific Technical Office for the European Commission Joint Research Centre, where she worked to assist member states on learning from incidents and Seveso implementation, including land use planning policy. She commenced as the Deputy to the Director of the IChemE Safety Centre in September 2017.

Abstract:

Process safety and plant integrity can be supported by the thorough application for both lagging and leading indicators or metrics. Those figures are as useful as the knowledge of their practical application as well as limitation. Plant managers should have a clear understanding of what they measure and more importantly, why.

To support their daily efforts, the IChemE Safety Centre developed its guidance document for practical application on process safety leading metrics and identified the most significant ones in 2015. Plant operators can make their decision as to which of those metrics they consider relevant to run their plant safely. There is, however, still a lack of consistency in lead metrics across industry and differing levels on understanding and interpretation of lead metrics in different companies.

The IChemE Safety Centre, in collaboration with its member companies from a wide variety of industrial sectors all over the world, realised the need for some consistency in measuring failure and launched a project in the beginning of 2018. They developed a supplementary guidance to provide context for barrier failures and in particular the lead metric 'barrier fail on test' and 'barrier failing on demand'.

The guidance could be used to help understand the difference between design and operational acceptance criteria. This first document focuses on providing more clarity on the type of failures/events to be included in your metrics and will also aid in the goal of capturing similar data across companies and across industries. This will allow for benchmarking and identification of good practice for us to learn from.

This paper presents the pass/fail criteria for the first set of safety critical elements, pressure relief devices and the connection to some lead process safety metrics in the original guidance document published in 2015.

7. The importance of safety in the distribution of chemicals and ingredients

Wednesday 16:00 - 16:40 – Conference Stream 1 - Carriage Suite

Alistair Hunter – Head of Compliance, Brenntag

*With a degree in applied chemistry, **Alistair Hunter**'s experience in the chemical industry spans over 30 years. As Head of Compliance at Brenntag UK & Ireland, Alistair is responsible for health, safety, quality, security and environmental compliance, overseeing the company's network of COMAH Upper Tier and Lower Tier sites. Alistair is the Chartered Member of IOSH, Chair of the Chemical Business Association (CBA) HSE Committee, Dangerous Goods Safety Adviser, as well as member of Brenntag EMEA HSE Team.*

Abstract:
Drawing on Brenntag's experience as the largest global distributor of chemicals and ingredients, Alistair Hunter provides perspectives on safety in chemical distribution including sustainability, regulatory compliance, risk management and various safety optimisation techniques.

With tens of thousands of deliveries undertaken by Brenntag UK & Ireland every month, it is impossible to underestimate the importance of safety in the company's operations. "Safety First" is a key principle for Brenntag and a number one priority. Building an all-encompassing safety and quality culture that permeates all levels of an organisation requires a holistic approach which considers several overarching aspects to ensure safe, secure and efficient distribution of chemicals throughout the supply chain.

The session will pay specific attention to the personal aspect of safety and will share insights on the initiatives Brenntag implemented to enhance its safety performance.

8. Guidance on fixed gas detection systems for use in Safety Instrumented Systems

Wednesday 16:40 - 17:20 – Conference Stream 1 - Carriage Suite

Dr. Hassan El-Sayed – Business Manager - Functional Safety, CSA Group

*Dr. **Hassan El-Sayed** started at CSA Group in early 2010 and has held the position of Functional Safety (FS) team lead for six years. He became Functional Safety Business Manager during the last four years and has executed many projects in functional safety assessment for oil and gas sectors, where IEC 61508 & IEC 61511 are heavily used, in addition to the safety of machinery. With over 30 years of industrial experience in FS applications & product design for HazLoc use, Hassan has published several functional safety papers at various conferences, such as ISA, HazardEx, Robots Automation and Fieldbus Foundation.*

Hassan invented the first redundant fieldbus system (Trunksafe) for use in Foundation Fieldbus which is widely used by Chevron, BP, Shell, and others. He has been awarded at least 10 USA and European patents in instrumentation and fieldbus and received an award of excellence for a paper presented at ISR (49th Symposium on Robotics, held in July 2017 in Shanghai, China). Hassan is an active member in TC31 / WG42 / WG09, SC65/ MT 61508-1/2, and GEL 65/01.

Abstract:
Manufacturers of fixed gas detectors must conform to the protection concepts from the EN/IEC 60079 series of standards to demonstrate full compliance against the ATEX Directive 2014/34/EU in order for their products to be suitable for use in hazardous areas.

Complying with electrical protection standards demonstrates that the products have met the electrical safety requirement, but not the performance requirement standards, because gas detectors are designed to measure different types of gases, such as combustible (Methane, Propane), Oxygen, or even toxic gases. Hence these gas detectors shall comply also with specific harmonised performance standards such as IEC/EN 60079-29-1 and 4. In addition, the software developed for processing the gas measurement shall be assessed to EN 50271 and/or EN 50402 or even IEC/EN 61508 for safety related systems. The question becomes apparent when looking at the measures and guidance that the system integrator or manufacturer must follow to ensure that these fixed gas detectors are installed correctly in the correct spots to perform correctly and provide maximum safety coverage for safety related systems.

It is well known in functional safety that system integrators must comply with IEC /EN 61511 and IEC/EN 61508 for Safety Instrumented Systems (SIS), but those standards do no provide guidance or clarification on fixed gas detectors for use in SIS in terms of the sensing points, appropriate locations, management of regular maintenance, system response time, calibration and gas sampling, or competency requirement, all of which have greater effect on the integrity of the overall SIS than the required safety Integrity Level (SIL) capability.

The IEC/EN 60079-29-3 provides such a guidance on fixed gas detectors for SIS since it is based on the safety lifecycle as detailed in IEC 61508, where specific requirements under “Functional Safety Management” must be adhered to so that all persons or companies involved in the supply chain are compliant. This IEC 60079-29-3 defines safety related consideration in connection to any associated peripheral fixed gas detection equipment in terms of the framework and use of IEC 61508 and IEC 61511.

9. A hazardous solution (ammonia)

Wednesday 11:30 - 12:10 – Conference Stream 2 - Reading Room

Peter Newport – Chief Executive, Chemical Business Association

CBA is a not-for-profit business organisation representing the independent chemical supply chain in the UK. Its member companies distribute, pack, and blend over four million tonnes of chemicals each year with a market value of almost three billion euros. ***Peter Newport*** *is a key industry advocate to governmental and regulatory authorities in the UK and Europe. He is also a board member and current Treasurer of the European Association for Chemical Distributors (Fecc) and a board member of the International Chemical Trade Association (ICTA).*

Abstract:

Peter's presentation will briefly touch on CBA, who CBA represents and what the Association does before moving on to a case study addressing a CBA led packaging development project for members. The presentation covers the background, design, development, UN testing and approval that offers a new solution to the safe carriage of higher concentrations of ammonia solution domestically within the UK.

10. What does it mean to be compliant?

Wednesday 12:10 - 12:50 – Conference Stream 2 - Reading Room

James Steven – Development & Innovation Manager, DNV GL

***James Steven** is an electrical and electronic engineer with over 20 years' experience of dealing with hazardous environments and applications. Having worked across the consumer, maritime, oil & gas and nuclear industries, James has a wide range of experience and is able to draw upon the best practices across these sectors. He now holds the role of Development & Innovation Manager Product Assurance at DNV GL UK where he leads the Business Development and New Service/Application Development for the oil & gas supply chain markets. He has been key in extending DNV GL's hazardous area services to the UK.*

Abstract:

The main topics of this presentation are Asset Management and Maintenance, Engineering & Design Safety, and Knowledge & Competence – standards and regulations governing the design, selection, installation and maintenance of equipment and systems in potentially hazardous environments provide a framework for ignition control.

Being a framework, they do not define a prescriptive method on how to comply with these requirements, which leads to a variety of practises, even drifting from the overall intent of the initial standards and regulations.

Utilising learnings from onshore and offshore markets, this paper will explore how common practises have led to threats to the integrity of hazardous area installations. It will also explore what effects this had on completion of projects. The paper will highlight how some interpretations of requirements have impacted on supplied equipment, in relation to operational maintenance of hazardous locations. Some common "perceptions" of compliance, such as where differences in understanding has the potential to leave stakeholders exposed, will also be explored.

In conclusion, James will present what is considered to be the key factors to ensure hazardous area installations will be compliant and also how this can be easily demonstrated. Further, he will explain how a compliant approach can improve the safety and operational delivery of hazardous area installations.

11. Markings explained

Wednesday 14:00 - 14:40 – Conference Stream 2 - Reading Room

Chris Thomas – Electrical Engineer, Intertek

***Chris Thomas** is an Electrical Engineer with extensive experience in hazardous areas and explosive atmospheres. He has worked in the industry for over 20 years and has particular expertise in Oil & Gas, Petrochemical, Manufacturing, Power Generation & Distribution systems and also Fuel station environments. Chris has worked with a variety of Certification and Notified Bodies, as well as writing and developing training courses and assessments which comply with ISO/IEC 17024.*

Abstract:
Despite their common appearance on almost everything purchased for industrial, commercial or personal use, equipment markings are one of the least understood and most error filled items when going through the compliance and certification process.

The markings and nameplate of a particular device or piece of equipment are meant to be a short description of the equipment enabling the end user to procure the correct equipment for the application and install it correctly.

However, when markings are incorrect or confusing it can lead to wasted time being spent on interpreting and clarifying what the original manufacturer intended to tell the end user about the equipment, including where and how it may be installed. Unclear markings may lead to the incorrect piece of equipment being purchased for the application.

The level of markings is largely based on the standard being applied during the certification of the equipment being manufactured. The importance of markings is often downplayed and is quite often an after-thought during the certification process. In reality, they should be one of the first things considered when developing a product as they can often lead to differing evaluation criteria and design considerations for the equipment.

If equipment is manufactured with confusing or incorrect markings, it may lead the manufacturer having a product which may not meet the criteria of what they originally intended to produce and may result in missing the target client or consumers of the equipment.

This presentation will seek to inform equipment manufacturers and end users about what the various markings typically placed on equipment mean and why certification bodies require certain markings to be shown. We will focus on hazardous locations markings for International markets (via the IECEx), Europe (ATEX) and North America and will include explanations on what and why certain markings are required.

12. The application of Intrinsic Safety in 2020

Wednesday 14:40 - 15:20 – Conference Stream 2 - Reading Room

Sean Clarke – Managing Director, ExVeritas

***Sean Clarke** is a Chartered Electrical Engineer and a Fellow of the Institute of Engineering and Technology and has 30 years' experience in electronics, safety systems and Ex Certification. Sean is currently the Managing Director of ExVeritas, an ATEX Notified Body in the UK and EU and an IECEX Certification Body. ExVeritas is also currently completing NRTL accreditation for North American Listing.*

Sean has been involved in Notified Body intrinsic safety certification for over 20 years and has been involved with intrinsic safety as a design consultant and as an ATEX Notified Body and IECEx CB Certificate issuer (but never at the same time!). Sean also presents training for intrinsically safe circuit designers worldwide with both introductory and advanced workshop classes.

Abstract:

This presentation looks at why intrinsic safety has always been 'evolving' and adapting, the problems that can give rise to and the potential benefits to designers in the future, as together with the protection concept, electronic technologies has been evolving faster than any other technology we know.

Certification can always change through official standards interpretations, clarifications, interlaboratory test programs and of course a 'new' standard (such as the pending Edition 7 of the intrinsic safety standard), but how do we communicate what is considered to be the 'correct' methodology and interpretations to designers and how do these standards follow evolutions on components that can be used on limiting circuits? Does there really have to be 'moving goalposts' in such a dynamic and progressive subject, or can we finally say that we now know the definitive methodology to make a circuit intrinsically safe?

This presentation considers 'why' we assess the way we do (such as historical limitations on data), why there may be variability in assessment techniques between bodies and what we are doing collectively (such as interlaboratory testing programs for IECEx) or as individual Certification Bodies to overcome that. The presentation will also consider the new emphasis put on specific technical issues such as the limitations of the 'design curves', transients, service temperatures and safety factors, as well as new methodologies and possibilities related to the kind of methods used on intrinsically safe and why that is turning what was once 'certification by theoretical analysis' in to 'certification by testing'.

13. Remote maintenance challenges in industrial applications - today and in the future

Wednesday 16:00 - 16:40 – Conference Stream 2 - Reading Room

Dr. Alexander Horch – Vice President R&D and Product Management, HIMA Group

*Dr. **Alexander Horch** is Vice President R&D and Product Management at HIMA Group. He joined HIMA in April 2016 having previously worked as Principal Scientist at ABB Corporate Research in Germany with a focus on process plant optimisation and plant asset management. Between 2007 and 2016, he held different management roles for ABB Germany and ABB Switzerland. Dr. Horch is a Certified Project Management Professional (PMP) and a Certified Automation Professional (CAP) of the ISA.*

Abstract:
On the one hand, the remote maintenance of process plants via public networks in an industrial environment enables considerable cost advantages. On the other hand, significant security risks can be expected by accessing control system networks remotely.

If your process network does not have an effective protective shield, a single security gap can make your production processes vulnerable to attacks – with potentially catastrophic consequences. It is necessary to reduce this vulnerability to a minimum and it requires considerable know-how to manage this problem efficiently. Ideally, this know-how is available in your own company or should be acquired through cooperation with a trustworthy partner. Doing nothing could be a serious mistake.

14. Challenges of air conditioning in hazardous areas

Wednesday 16:40 - 17:20 – Conference Stream 2 - Reading Room

Gido van Tienhoven – Director, Ex-Machinery Explosion Proof Equipment B.V.

Gido van Tienhoven *is an ATEX and explosion safety specialist who works with purchasers, production managers and college technicians of all industries dealing with gas and dust explosion risks to help them find the best ATEX solutions. As owner of Ex-Machinery, Gido has been awarded with a FD Gazelle 2017 for fastest growing companies in the Netherlands. Gido studied engineering at Delft University, the Netherlands and has worked in the field of explosion safety for 15 years.*

Abstract:

This paper focuses on the three main challenges of HVAC equipment in hazardous areas. It explains how to technically deal with these issues, eventually reducing total lifetime cost.

Corrosion - Air conditioning units are well maintainable as all moving parts and electrical parts can be easily replaced on site at a relatively low cost. However, two exceptions that cannot be maintained are the structure and casing of a condensing unit and the condenser itself. Both are sensitive to corrosion which is the main reason for the end of life of an air conditioning system.

Hazardous area classification and investment cost - This part of the paper explains how the hazardous area classes for both the indoor unit and outdoor unit of a split system air conditioner influence equipment cost. It results in a matrix with evaporators and condensers vs. the area classes. The end of this section gives tips on how to reduce the area classification for both condensers and/or evaporators.

Calculation of cooling capacity and selection of proper refrigerant - Cooling capacities of air conditioners in hazardous areas are more difficult to calculate compared to standard HVAC systems, especially in off-shore situations. The cooling capacity as calculated in BTU/Hr, RT or kW seems to be the main factor, but needs interpretation. Examples and definitions will be presented briefly leading to a correct cooling capacity. Based on these definitions some easy rules of the thumb that can serve as a guideline will be presented.

Day two - *27/02/2020*

15. The Chevron Explosion 2011 – Electrical, Control & Instrumentation Investigation

Thursday 09:40 - 10:20 – Conference Stream 1 - Carriage Suite

Peter Evans – Specialist Inspector, HSE

Peter Evans *joined HSE in 2005 as an Electrical, Control and Instrumentation (EC&I) Specialist Inspector of HSE's Chemicals, Explosives and Microbiological Hazards Division. Before joining HSE he worked for over 17 years in the field of Electrical Engineering at various COMAH establishments, across South Wales. He is a focused and committed Chartered Engineer (CEng) and a Member of the Institute of Engineering & Technology (IET).*

He is actively involved in the review, development, standardisation, regulation and enforcement of relevant good practice, key benchmark standards, European & International Standards, Codes of Practise and other sector specific guidance etc. associated with Electrical Equipment used in Potentially Explosive Atmospheres. He was involved with the Buncefield investigation at Hemel Hempstead in Dec 2005 and was the Lead EC&I Inspector for the Chevron Refinery explosion in June 2011.

He is also responsible for providing HSE representation on EXL/031/03 – codes of practice and a myriad of other external stakeholders, trade associations, technical committees and professional bodies (e.g. EI, BSI, EEMUA, IET, CompEx, NICEIC etc.). He has a unique skillset of both technical and legal expertise and excellence that is indispensable within the professional field of Engineering.

Abstract:
This presentation will explore the Electrical, Control and Instrumentation elements of the investigation into the fatal incident at Chevron's Pembroke oil refinery on June 2, 2011. The presentation will focus on the EC&I aspects of the investigation, such as gas testing, electronic data recovery and analysis (PV.data), earthing & bonding, portable electronic devices and hazardous area classification. It will also show some interesting videos and images.

16. Confusion over risk criteria

Thursday 10:20 - 11:00 – Conference Stream 1 - Carriage Suite

Carolyn Nicholls – Director, RAS Ltd

*A Director of RAS Limited, **Carolyn Nicholls** leads a team of risk and hazard management consultants and has been instrumental in creating the company's assessment methodologies. Carolyn has experience of working with a large number of UK COMAH sites to develop safety reports and provide support in all aspects of risk management.*

Abstract:

Risk assessments come in all shapes and sizes. They range from the estimation of risk based on experience; through to semi and full quantification. Once the assessment is complete and there is a robust understanding of the risk it should be decided if the risk is tolerable.

If the risk is tolerable the next stage is to satisfy the challenge of demonstrating the risk is ALARP. Those key decisions require operators to be using appropriate risk criteria. There is no one size fits all. Individual risk of fatality is not always the appropriate risk criteria, yet it is the go-to for many carrying out risk analysis. This is possibly because it is a relatively simple criteria, or maybe because it is the criteria that is more easily found within guidance published by the regulator.

There is a general lack of appreciation for the limitations in using Individual Risk Criteria as a measure. Examples include:

1. Risk Calculated in LOPA
2. Representative Scenario Risk
3. Societal Risk
4. Matrices
5. IR for ALARP decisions

There are many challenges due to the lack of clear and simple guidance in this area, which creates difficulty in operators being able to act as intelligent customers.

17. SIL Certification – value or vanity

Thursday 11:30 - 12:10 – Conference Stream 1 - Carriage Suite

Paulo Oliveira – Associate Director, Engineering Safety Consultants (ESC)

***Paulo Oliveira** is a Chartered Engineer (CEng) with more than 10 years' experience in asset management and safety applications. Paulo has split his experience in project, maintenance and safety roles in hazardous and non-hazardous industries, such as chemical, steel and FMCG. Paulo was the Functional Safety Leader for a COMAH top tier site where he was accountable for the development and implementation of IEC61511 compliant systems, covering the whole lifecycle including competence and with links to broader Process Safety areas like process hazard analysis, human factors, alarm management and compliance auditing under OSHA 1910.*

As part of ESC's team, Paulo specialises in IEC61508/61511 compliance, certification and broader reliability analysis, including experience in chairing SIL Determination studies (UK and ME), SIL verification and reliability modelling, IEC61511/IEC61508 compliance gap analysis, Functional Safety Assessments, competence reviews and product certification including FMEA studies.

Paulo is a certified TÜV Rheinland Functional Safety Expert and Trainer in Safety Instrumented Systems (SIS - #301/19) within the TÜV Rheinland Functional Safety Training Program for courses accredited on the scheme. Paulo is also an CMSE - Certified Machinery Safety Expert (TÜV Nord).

Abstract:
Is the well-presented stamped paper certificate an indulgent bureaucratic way to feel good about using equipment in a safety critical application, or does it actually carry value with regards to evidencing an adequate level of compliance with IEC61508?

IEC61508 requirements for a traceable and systematic approach to the capability of safety related systems has given rise to certification activities which aim at quantifying the SIL capability of elements and systems. The IEC61508 standard does not mandate certification as a necessary activity to demonstrate compliance with the requirements explicit therein. So why is certification needed?

The risk of poorly structured analyses and vague capability statements could result in an application with non-competent safety-related system equipment with significant integration issues which could result in flawed claims of compliance and capability against IEC61508 and subsequent inability to provide the necessary risk reduction. Conversely, the need for a certificate does not assure the items covered under the certificate are better developed to provide the risk reduction than other non-certified equipment.

This paper aims at providing a view based on the application of a compliance assessment process to IEC61508 and highlight some of the benefits and downfalls of typical certification process for equipment or systems. The presentation will also provide examples of good certification processes, expected deliverables, required activities and look at typical inflated claims of SIL capability which could potentially compromise risk reduction requirements associated with your application.

18. Marrying IEC62443 Cybersecurity Levels (SL) with IEC61508 SIL

Thursday 12:10 - 12:50 – Conference Stream 1 - Carriage Suite

Harvey T. Dearden – Engineering Director, HTS Engineering Group

Harvey T. Dearden *is Engineering Director of HTS Engineering Group and a Director of SISSuite Ltd. and Time Domain Solutions Ltd. He is actively involved with the Institute of Measurement & Control and specialities include: Implementation of IEC61508/61511 (SIL), DSEAR/ATEX; Development/ troubleshooting of control systems/strategies; Development of engineering management policy/procedures; Auditing of fiscal measurement systems and Training on control/measurement/protection systems. He previously held senior engineering positions at Great Lakes Chemical, Associated Octel Company, Costain Oil and Gas & Process Ltd.*

Abstract:

The standard IEC 62443: Security for industrial automation and control systems (IACS) proposes the assignment of security levels 1-4 to IACS zone provisions. The temptation is to see these as comparable to the four Safety Integrity Levels of IEC 61508, but this would be a mistake; there is no equivalence. This paper will explore the relationship between SL and SIL and show how they may be related through an appropriate risk calibration for a given enterprise.

19. How do we define good practice for Fire and Gas Detector Mapping?

Thursday 14:00 - 14:40 – Conference Stream 1 - Carriage Suite

Tim Jones – Principal Consultant, RPS Group

***Tim Jones** is a Chartered Mechanical Engineer, specialising in process safety and hazard modelling and has worked on projects around the world under a variety of different regulatory regimes. He is highly experienced in conducting consequence modelling using both empirical and Computational Fluid Dynamics (CFD) techniques. This covers gas, fire and explosion modelling for flammables and toxics.*

Tim has applied his understanding of hazard modelling to fire and gas detector mapping and optimisation and is on the British Standards Committee covering this topic. He also sits on the IMechE Upstream O&G and North-West Process Division committees as well as the Oil and Gas UK (OGUK) flare and vent working group.

Abstract:

Fire and gas detection – as part of a structured process safety management system – plays an important role in the protection of people, the environment, assets and corporate reputation. Detection is dependent on both the hardware's ability to function on demand and detectors being located in the 'right' place.

Historically, there has been a significant effort invested in ensuring detectors function on demand and less focus given to their positioning (termed fire and gas detector mapping). This is evidenced by data from the HSE Offshore Release Database which indicates that a large proportion of releases go undetected – 36% of major and 69% of significant gas releases. Should these releases ignite or be toxic the consequences can be devastating.

At present there is limited guidance on how many detectors you need and where they should go. ISA-TR84.00.07 gives detailed guidance on a fully quantitative method but limited guidance for toxics. So why is there such little guidance available? The answer is that the locating of detectors is not trivial and can be influenced by many factors such as ventilation conditions (both forced and natural), nature of the fluid being released, congestion, confinement, amongst others.

Despite limited guidance, there has been significant investment in recent times in Fire and Gas Detector mapping and with the development of parallel computing and machine learning techniques such as Computational Fluid Dynamics (CFD) and genetic algorithms, many commercial software packages are now available that can 'aid' the mapping process. However, even with the advances in technology, the age-old problem of 'garbage in equals garbage out' still remains and without guidance there is often little consistency or documentation that justifies the number and position of detectors.

The industry is addressing this issue through the development of a British Standard that is to be released in early 2020. The aim of the British Standard is to bring consistency to fire and gas mapping and give guidance on the key points to consider for the hazard against which you are trying to protect. The guidance will also cover toxic gases, a topic which is even less documented than flammable gas and fire detection.

This paper will take guidance from the British Standard and explain how we define good practice for Fire and Gas Detector Mapping and how it can differ dependent on the application and hazard you are protecting against.

20. Industrial and hazardous area LED lighting technology lights the way to safer operations

Thursday 14:40 - 15:20 – Conference Stream 1 - Carriage Suite

Bill McDonough – Product Marketing Manager, Dialight

Alison Quinn – Sales Director of Europe and EMEA Key Accounts Manager, Dialight

***Bill McDonough**, Product Marketing Manager at Dialight, has 40 years of experience in the lighting and electrical industries specialising in industrial and hazardous applications. During his career he has held various Sales, Marketing and Product Development positions. In his current role at Dialight, Bill is utilising his industry knowledge and hazardous markets experience to advise on customer needs and emerging industry trends. Prior to joining Dialight in 2009, Bill was the Western U.S. Area Sales Vice President for Cooper Lighting.*

***Alison Quinn** is the Sales Director and Key Accounts Director of EMEA for Dialight. She has more than 15 years of lighting industry experience and has a degree in Mechanical Engineering from the University of Bath. Alison has extensive experience in LED lighting having previously worked for Whitecroft Lighting and OSRAM. She also spent time at Daikin Air-conditioning.*

Abstract:

Poor lighting is a leading cause of the most common types of industrial workplace accidents, causing millions of injuries and costing billions of pounds each year. And, studies show that improving illumination decreases accident rates by more than 60%. Industrial LED lighting technology is proving to be the most effective and efficient source of light for manufacturing operations. This paper demonstrates how industrial hazardous-location certified LED lighting can dramatically improve facility safety due to its superior colour, clarity, long-life performance, smart lighting compatibility and hazmat-free construction.

21. Knowledge of Ex, competency of those involved, and communication methods

Thursday 09:40 - 10:10 – Conference Stream 2 - Reading Room

Árpád Veress – Director, ExNB

Mike Marrington – Director, Ex Compliance Global

Árpád Veress *is a hazardous area Ex Professional and Director of ExNB (ATEX Notified Body 2684), working as an ATEX and IECEx assessor in various industrial areas worldwide. Since 1997 he has been active in the world of explosion protection. Besides owner's engineering, audit and inspection services, Árpád is involved in Ex personnel competency training, assessment and certification related to ATEX and IECEx. Since 2016 he has been part of ExNB Certification Institute - product and Ex personnel competency certification.*

Michael Marrington*, Director of Ex Compliance Global (ExCG) is an Ex & Quality Consultant with 14 years of experience worldwide between Onshore, Offshore, Oil & Gas, Mining, Power Generation, Manufacturing, & Wood Industries.*

Beginning in 2006, Michael was involved in North American HazLoc (Class/Div and Class/Zone), eventually transitioning internationally in 2010 to IECEx / ATEX / EEHA. Past roles have included Consulting, Subject Matter Expert, Coordinator, Senior Inspector, Trainer, Assessor, and Auditor with such customers as: End-Users, EPC, Vendors, Module Yards, Manufacturers, Training & Certification Bodies, ATEX Notifiying Bodies, and IECEx ExTL's & ExCB's to IECEx 02, 03 and 05.

Abstract:

A detailed discussion about current approaches to Ex Competency, known industry short-comings, potential pitfalls, and solutions to achieve 'Best Practice.' With a detailed emphasis on including all industry stakeholders (Manufacturers, ExTLs, CBs, EPCs, and End-Users) and the people within these organisations.

The benefit for delegates from this presentation will be increased awareness of industry issues, solutions, and emerging trends that many may not know of, but delegates can provide positive impact through their participation. With a strong emphasis on sharing international experiences, how to overcome trade barriers, and important consideration of multiple variables and impacts (Quality, Safety, Environmental, Cost, Schedules) on Stakeholders (Client, Contractors, Communities, Government, etc).

22. The importance of cable gland IP ratings

Thursday 10:20 - 11:00 – Conference Stream 2 - Reading Room

Dr. Geof Mood – Technical Director, CCG Cable Terminations

*Dr. **Geof Mood** has been the Technical Director for CCG Cable Terminations for the last 5 years. He has specialised in the design, development and certification of cable glands and accessories for over 14 years but has also been involved in product development and certification of a variety of products such as heating, lighting and compressed air cylinders for many more years than he cares to admit to. Dr. Mood is an active member of a number of National and International standards committees which he attends as a cable gland expert.*

Abstract:
IP ratings are usually defined during the design stage of an installation but are often not fully understood in detail by specifiers and the resulting installation may not achieve the safety levels required. The IP ratings of cable glands in particular can lead to confusion about the level of protection that will actually be achieved in an installation.

For instance, the fitting of an IP66 cable gland to an IP66 enclosure can result in an installation with an IP rating of only IP54 because of issues with the sealing of the interface. Changes introduced in Edition 7 of IEC 60079-0 have addressed this issue of the IP rating of the interface between a cable gland and the equipment it is connected to, but in some cases the changes have been misinterpreted or overlooked during certification.

The purpose of this paper is to explain in clear and simple terms what an IP rating means and more importantly what it does not mean (but is usually assumed to mean). The paper will discuss the changes to IEC 60079-0 with respect to IP ratings of cable glands and also a recent ExTAG Decision Sheet which clearly defines the intention of the changes. Some guidance will be given about what to look for to make sure that the installation meets its intended IP rating. Examples will be given of what can happen to an installation when IP ratings are not achieved, and the potential costs involved. The paper will also consider some practical solutions to the problems of water ingress into equipment where it is unavoidable.

23. IIoT communication and networking in hazardous areas

Thursday 11:30 - 12:10 – Conference Stream 2 - Reading Room

Glynn Warren – Product Manager, Extronics

*A technical expert with over 20 years' experience working with hazardous area electrical equipment, **Glynn Warren** is keen to share his knowledge of wireless and RFID technologies in particular. Having previously worked at Newson Gale and Cooper MEDC as well as Extronics, Glynn is committed to helping customers identify the right solution for their application and supporting them to achieve success.*

Abstract:

The Industrial Internet of Things is becoming a reality. With more and more companies looking to leverage the IIoT to improve safety and productivity, how do we implement such connectivity in our hazardous areas?

This paper will look at the requirements of hazardous areas and why IIoT technologies could pose a risk. It will identify the relevant protocols and hazardous area standards that could impact your IIoT strategy, including the most common methods of certifying equipment and their advantages and disadvantages. The presentation will also look at other factors for process industries, such as site size, existing infrastructure, work patterns, and environmental conditions.

Some of the key technologies that can be used for communication on process industry sites will be outlined, such as Wi-Fi networking, 4G / LTE telecommunications, Ultra-Wide Band (UWB), and BLE (Bluetooth Low Energy). This includes diving deeper into their benefits and drawbacks, as well as identifying which technology is most suited to your different use cases. Case studies will also show different technologies in use, as well as how the technologies can work alongside each other for true IIoT integration.

Your communication network is only part of your IIoT story, so this paper will discuss complementary technologies like Bluetooth, RFID, and smart mobile devices. It will also show how they contribute towards a cohesive Internet of Things or Industry 4.0 approach to operational needs, as well as providing case studies of how end users have leveraged connectivity on their sites to improve productivity, asset management, and worker safety.

Finally, delegates will be walked through some initial steps that can be taken towards full Internet of Things connectivity, and how you can leverage it for improved ROI and future-proof technology integration. This paper will help you plan for IIoT success – identifying key goals, how to choose the technology or technologies that'll help you succeed, and how to safely rollout that out across ATEX, IECEx, and North American hazardous areas of varying categories.

24. IECEx Hazardous Area certification for non-electrical (mechanical) equipment

Thursday 12:10 - 12:50 – Conference Stream 2 - Reading Room

Scott Harding – Sales Director, Woodcock & Wilson

Scott Harding *is Sales Director and joint owner of Woodcock & Wilson and is a member of the Nuclear Institute, National Nuclear Ventilation forum, SHAPA, and the Fan Manufacturers Association. He has over 28 years' experience in the industrial fan industry covering fan design, manufacture and process safety. He is a driving force behind mechanical safety within the process industry, providing knowledge sharing with lectures & presentations on the ATEX fan standard EN14986 and the introduction of the IECEx non-electrical standard in 2016.*

Abstract:

This paper will discuss the IECEx Hazardous Area certification which now covers non-electrical (mechanical) equipment. Certification of equipment for use in potentially explosive atmospheres has been around for many years. There is a well-established supply chain for electrical equipment and knowledge through our industry is generally good. Currently, two certification schemes covering both electrical and non-electrical equipment exist, but awareness of non-electrical (mechanical) equipment requirements within the industry is poor and re-education is a slow process.

Since the ATEX Directive was introduced in 2003, both electrical and mechanical equipment was accounted for; before 2003 only electrical equipment had any formal certification for hazardous areas – a big change.

ATEX compliant equipment is mandatory for use in hazardous areas throughout the EU. In the European Union compliance is a legal requirement; this is not so for the rest of the world. The ATEX Directive allows manufacturers to "self-certify" mechanical equipment for use in Zone 1 and Zone 2 hazardous areas, introducing doubt as to the manufacturer's ability to produce compliant goods. However, electrical equipment requires independent certification for use in a Zone 1 area and more often than not, electrical equipment manufacturers also provide independent certification for Zone 2 products.

IECEx is a worldwide certification system for both electrical and non-electrical equipment and requires full compliance to IEC International standards. "Self-certification" is strictly not allowed. Manufacturers of both electrical and non-electrical equipment must have been awarded an IECEx Certificate of Conformity, prior to manufacturing the goods, by an approved IECEx Notified Body.

In 2020, issues are now coming to light with mechanical equipment manufacturers misunderstanding the requirements of the IECEx non-electrical requirements. Ignorance within the industry is allowing mechanical equipment to be put on to the market on the back of an IECEx electrical Certificate of Conformity only. Non-electrical equipment must carry an IECEx Certificate of Conformity that specifically references EN ISO 80079-36 and EN ISO 80079-37. For example, manufacturers of pumps, fans and gearboxes can no longer offer IECEx compliant goods by "bolting on" an IECEx compliant motor to an ATEX certified product.

25. The importance of layering PPE to protect against Arc Flash

Thursday 14:00 - 14:40 – Conference Stream 2 - Reading Room

Hamilton Smith – Technical Sales Manager, ProGARM

***Hamilton Smith** is a Technical Sales Manager at ProGARM, a market leading clothing solution in Flame Resistant and Arc Flash garments. Through his role, Hamilton is focused on helping companies protect the lives of their workforce, whilst ensuring they meet the latest health and safety standards by providing the best in class Flame Resistant and Arc Flash clothing solutions.*

Abstract:

In industries working around high and low voltage electricity, the dangers posed by an Arc Flash must not be underestimated. With temperatures of up to 35,000°F, an Arc Flash can burn an operative's skin within fractions of a second, meaning PPE really is the last line of defence for workers. Yet there's a surprising lack of knowledge when it comes to relevant legislation and appropriate protection.

It's important for employers, operatives, and health and safety managers alike to understand the importance of layering Arc Flash PPE, and the dangers that can be posed by wearing everyday clothing underneath protective outerwear.

While the outer garments are key components for providing protection, they are not enough to match the risk posed to an operative's safety, meaning Arc Flash PPE base layers should be worn at all times.

This is because, while the flames may not come into contact with skin through the protective outer layers, the extreme heat can melt materials used to manufacture everyday undergarments. This will inflict burns and potentially cause non-Arc Flash protective undergarments to melt into the skin underneath their PPE. To ensure effective Arc Flash protection, all base layers must be Arc-resistant – everything from base layer leggings, tops and even underwear.

26. Risk-based DSEAR assessment of high flashpoint "Class III" fuels

Thursday 14:40 - 15:20 – Conference Stream 2 - Reading Room

Tony Ennis – Director, Haztech Consultants Ltd

Tony Ennis *is a Chemical Engineer with a degree from Leeds University and a Masters in Computer Simulation of batch Reactors from Nottingham. He has worked for a variety of companies including Shell, Air Products and ICI and in a variety of roles including production management, project engineering and process design.*

Tony Joined ICI Engineering in 1993 and has been a full-time process safety specialist since that time. He specialised in fire, explosion and gas dispersion and pressure relief systems. Leaving ICI in 2000, he joined Haztech Consultants as Technical Director working in broadly similar areas.

Tony has specialised in fire and explosion hazards especially relating to DSEAR for some years. He previously sat on the committee of the UK Explosion Liaison Group and is currently on the committee responsible for the updating of EI15 Model Code of Safe Practice. Recently, he has been involved in the assessment of the hazards relating to high-flashpoint fuels.

Abstract:

Class III fuels are defined as those having a flashpoint at or above 37.8°C (100°F) and below 60°C under the CLP Regulations. The upper flashpoint for these materials was previously 55°C under CHIP. The change has resulted in many common fuels such as diesel and gas oil with flashpoints specified as ">56°C" (i.e. between 55°C and 60°C) falling into Class III. The objective of this paper is to clarify the issues which have been raised by the reclassification of diesel and similar fuels.

The DSEAR assessment of fuels having flashpoints >50°C has been the subject of much research and several pieces of guidance, not all of which are entirely helpful or practical to implement. With this in mind, consideration has been given to how the risks of storage and handling these fuels can be assessed appropriately without excessive costs being incurred and whilst ensuring that risks to persons are As Low As Reasonably Practicable (ALARP).

This paper considers the fundamental physical and flammability properties of the materials and assesses how these factors impact the hazardous area classification and the associated risk of fire and explosion. In particular, the effect of flashpoint on the requirement for hazardous area classification are taken into consideration.

The potential risk of misting is examined under common situations of pumping and filling of tanks from typical fuel dispensing operations. The nature of fuel mist is explored and the difference between "mists" and "sprays" is clarified. The risk of the heating of liquid fuels by hot surfaces creating a flammable vapour is also considered.

The relevant guidance for hazardous area classification is considered, including BS EN 60079-10-1, EI15 and the APEA Blue Book. Research carried out by the HSL into formation of mists is considered.

Guidelines are proposed for hazardous area classification of fuels based on the flashpoint and expected range of ambient temperatures. Several misconceptions are explored with regards to the requirement for zoning of materials with flashpoints of >55°C. Several examples are considered with respect to the risk of fuel handling in common operations.