Hazards forum

The Hazards Forum Newsletter

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Hazards Forum Newsletter

Issue No. 94 - Spring 2017

Contents

Edited by Dr Neil Carhart

Views expressed are those of the authors, not necessarily of the Hazards Forum

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March 2017

Hazards 27 Process Safety Conference

IChemE

"There are no new accidents, just lessons to be learnt from the ones we have already had."

The Honourable Mr Justice Haddon-Cave, speaking at Hazards 26

IChemE's (Institution of Chemical Engineers) annual process safety conference takes place in Birmingham, UK on 10–12 May and is set to provide a comprehensive review into how to reduce the risk of hazardous events.

Aimed at anyone who is active in process safety and risk management, Hazards 27 will present latest developments, best practice guidance and lessons learned in process safety, offering essential technical insight into how to reduce and manage risk effectively and make working environments safer.

Conference programme

Hazards 27 offers a packed programme of presentations, sharing the knowledge and experience of almost 100 leading experts from around the globe, with contributions from industry, academia and regulatory bodies. Presentations will cover all the functional areas that are fundamental to managing and reducing risk effectively: engineering and design, systems and procedures, knowledge and competence, human factors, assurance, culture, and environmental protection. The conference is designed to appeal to process safety professionals working at all levels and in all industry sectors.

As well as the oral presentations, there will be an extensive range of posters to view throughout the conference. Hazards 27 also offers optional pre-conference workshops exploring retrospective HAZOP studies, emergency planning, human factors, inherent safety, and risk graphs in more depth, as well as the opportunity to join a free debate on the future of process safety.

Keynote speakers

Invited speakers from **BASF**, **Unilever**, **Shell** and **Marsh Energy** will give keynote presentations, with themes including: how to drive continuous process safety improvement across a complex organisation; the importance and practical application of good process safety management in the fast moving consumer goods (FMCG) sector; why process safety management systems are so important to a wide spectrum of industry and not just the high hazard chemical industries; the fundamentals - or 'life-saving rules' - of the process safety world; and insurance risk engineering.

Lessons from the fast lane

The conference will also welcome guest speaker, Formula One analyst **Mark Gallagher**, who will deliver a lecture created to honour the memory of process safety pioneer Trevor Kletz. Mark will draw parallels between risk management in the very different worlds of motorsport and the process industries, offering insights into the evolution of risk management and safety culture within Formula One, and discussing how the lessons learned can be transferred to the chemical and process industries.

Trade exhibition

An exhibition will run alongside the conference, showcasing products and services to help reduce the risk of hazardous events, with exhibitors including ABB Consulting, BakerRisk, CGE Risk Management, Cogent Skills, DNV GL, Fike, Micropack Engineering and Risktec Solutions. The latest list of exhibitors is available on the conference website. Stands and sponsorship packages are still available, with options available to suit all budgets.

Networking opportunities
There will be plenty of opportunity to network with top experts and industry peers throughout the event, including a free welcome drinks reception in the exhibition area, and an informal social event.

Registration
Online registration is now open, and includes a special offer to bring along a young colleague for half price. See the conference website for details.

For full conference details, including the sponsorship and exhibition opportunities available, and to register, visit www.icheme.org/hazards27

Design Safety – The Inherently Safer Way

Neil Carhart

On **Wednesday 7th 2016** the Hazards Forum hosted an **evening event** at the Institution of Chemical Engineers, One Portland Place, London.

Recent anniversaries of major accidents such as Flixborough (1974), Bhopal (1984) and Piper Alpha (1989) are reminders of the dangers posed by the chemical and other industries. Whilst lessons to reduce the risks of such accidents have led to great improvements, the way to avoid or reduce the scale of such hazards is to improve the basic design. Inherently safer design (ISD) was a philosophy originally championed by Trevor Kletz in the chemical industry. Since then ISD has been more broadly applied, although moving from philosophy to systematic application has sometimes been challenging.

This event explored the use of inherently safer design (or analogous approaches) in a cross section of industries, with particular focus on what is needed to make it happen in practice.

The **Chair** for the evening was **Peter Hunt,** director of business development at ABB Consulting. Peter has held senior leadership roles within ABB for over 15 years and his previous experience included working in a variety of senior process engineering, production, management and process safety roles for BP, Tioxide, Rohm & Haas and ICI. He is a Fellow of the Institution of Chemical Engineers having studied Chemical Engineering at Loughborough University where his Process Safety lecturers included Frank Lees and Trevor Kletz. He is a member of IChemE's Teesside Member Group and a past Chair of the Northern Branch. He was a member of IChemE's governing Council for four years and subsequently a member of its UK Board.

The evening's opening presentation was delivered by **Graeme Ellis**, author of the 2014 Energy Institute guidance on Inherently Safer Design. He addressed the basic concepts and emphasised the need to apply them from an early stage of project development. He illustrated this with application examples from the chemical industry.

The second speaker, **Ryan Atkins** discussed how the Hinkley Point C EPR design has been systematically assessed to demonstrate adequate protection exists in the event of a hazard. He described the high level objectives of hazard protection and outlined the methodology applied to demonstrate that objectives are met, outlining the application of both inherent and non-inherent hazards safety features.

In the final presentation of the evening **Vincent Tam** discussed how the offshore industry poses specific constraints on the application of inherently safer design methodology. He described how factors affecting effective implementation of ISD in engineering projects are identified and addressed.

Andy Furlong, Director of Communications at IChemE, welcomed the audience to the event. He opened the event by emphasising the importance of collaboration to process safety, and in that light welcomed the continuing relationship between the IChemE and the Hazards Forum. He then handed over to the evening's Chair.

Peter Hunt highlighted the diverse industries represented by the audience and speakers before introducing the first speaker.

Graeme Ellis began his talk, '*Avoiding hazards by design in the chemicals industry – The inherent safety way*', by discussing the background to the concept of inherent safety. It is an area of study that has a broad range of applications across many different industries. The Health and Safety Executive uses a definition that describes the inherent safety approach as "one that tries to avoid or eliminate hazards, or reduce their magnitude, severity, or likelihood of occurrence, by careful attention to the fundamental design and layout." They go on to say that "Less reliance is placed on 'add-on' engineered safety systems and features, and procedural controls, which can and do fail."[1].

Most engineers operate under a paradigm that leads them to overly focus on the design of additional features to mitigate the consequences of a hazard, whilst overlooking the fundamental causes. The challenge is to get away from the idea of safety as a bolt-on feature, to reflect more deeply on the initial design as a means to limit risk. This requires changing mind-sets. Trevor Kletz summed up the underlying principle of inherent safety when he said: "What you don't have, can't leak". These sorts of provocative statements are powerful for achieving that mind-set change.

Inherent safety requires the early adoption of this perspective in a projects lifecycle. It is something that must be embedded in the design stage.

The Bhopal incident in 1984 is perhaps the worst process industry accident to have every occurred. It resulted in around 15,000 deaths and many hundreds of thousands exposed to hazard. The basis of safety on the plant was ok in a traditional sense, in that there were multiple safety systems. However, all of those protective systems failed on the day of the accident. Despite multiple barriers, none were actually functioning. One perspective would be to focus on these individual failures and look for suitable improvements to prevent repetition. However, the inherent safety perspective provides many more lessons. For example, the chemistry of components in the system could have been designed differently to reduce risks. The volume of intermediate storage on site was unnecessary large. Following Bhopal many facilities questioned whether it was necessary to keep such large quantities of hazardous material on site, resulting in them reducing their intermediate storage. A lot of the people who were killed weren't there when the facility was built, so there were missed opportunities to preserve the inherent safety of the site by limiting such development nearby.

Graeme described six principles of inherent safety.

- **Elimination** – avoid the hazard completely
- **Substitution** – reduce the hazard severity by changing nature of hazard
- **Minimisation** – reduce the hazard severity by changing scale of hazard
- **Moderation** – reduce the hazard severity by minimising the impact of a release or hazardous event
- **Segregation** – limitation of effects reducing potential for hazard to cause harm
- **Simplification** – reduce the hazard likelihood by inherent features of the design.

The common theme that links these is a focus on minimising the hazard by design rather than adding protective systems. Having recognised a potential hazard the first step is to ask whether it is necessary or can be avoided altogether. An example would be subsisting solvent-based paints with water-based paints. The hazards associated with flammable solvents are then avoided.

One of the other concepts is a hierarchy of measures and controls. These can range from mitigation measures that try and limit the consequences (e.g. a fire engine attending a fire) to inherent measures to remove the consequences entirely (e.g. segregating flammable sources). Similarly controls can range from procedural controls, relying on factors such as culture, knowledge and activity, to inherently safe controls.

One might think that there are engineering standards and legislative drivers pushing for inherent safety, but this is not always the case. Most of the standards accept that there will be hazards and discuss the expectation for protection against those hazards, but few ask whether the hazard is actually necessary. Graeme did provide a couple of examples where inherent safety is considered. The Seveso Directive/COMAH does provide some guidance, saying that inherent safety should be considered first when feasible. It is not prominent within the directive, but it is there if you are looking for it. The Offshore Safety Directive 2013 places inherent safety more centrally, advocating that early stages of the design consider inherent safety. While legislative drivers do exist then, it is necessary for companies to take the lead themselves in pursuing inherent safety, and there is a lot of guidance out there to help them.

A lot of contractors involved in the construction of plant will have a focus on capital expenditure (CAPEX) to ensure the costs are acceptable; however, operators will need to consider the whole lifecycle. When it comes to inherent safety, something that may cost marginally more during conceptual design and plant construction may save a vast amount of money in the long run. The biggest chance for change is in the early stages of the project; options narrow as the project progresses. This is emphasised in the guidance on inherent safety published by the Energy Institute[2].

The Inherent Safety Workshop method aims to structure and record the consideration of potential hazards and the options for developing inherent safety during the conceptual design stages of a project.

Graeme discussed a case study exercise he had conducted for a plant in South East Asia during its late research and development phase, from which many actions were taken forward into the final plant design. For example, it was recommended that all chemical transfer lines be welded rather than using flange joints, and routed away from plant structures. This removes certain hazards. If things like this are not built into the project scope then it can be very difficult to retro-fit the plant to accommodate them.

In conclusion Graeme emphasised that inherent safety is not new, the principles were developed in the 1970s. The take up in industry has been slow, and there is still very little evidence of up-front consideration of hazards and inherent safety. The tools and techniques have not become as established as they have for other forms of risk assessment. There is a lack of a structured approach to identify opportunities, and many companies seemingly feel that inherent safety is not relevant to their specific operations. It is a novel mind-set that needs to be adopted to replace the dominant one that simply accepts hazards as unavoidable. While there is legislation this change has to be something that comes from within each individual company. The concepts of inherent safety are applicable regardless of the industry.

Ryan Atkins followed with a presentation on the application of inherent safety features to the Hinkley Point C design.

The UK European Pressurised water Reactor (UK EPR) is designed in accordance with the European Utility Requirement (EUR) Safety Principles. These are based on French and German reactor designs. EDF Energy has its own assessment principles in addition to these. Hinkley Point C (HPC) is therefore also assessed in accordance to their Nuclear Safety Design Assessment Principles (NSDAPs). Furthermore, Licensee submissions are assessed by the Office for Nuclear Regulation (ONR) against their own Safety Assessment Principles (SAPs). The regulator's framework is based upon the ALARP principle.

The fundamental safety objective of all three sets of safety principles is essentially to protect people and the environment from the harmful effects of ionising radiation. The NSDAPs and EUR are built around a concept of Defence in Depth. This can be summarised as:

1. Prevent deviations from normal operation;
2. Detect and control deviations from normal operation and prevent accident conditions;
3. Engineered Safety Features to bring the plant to a safe shutdown state in the event of an accident condition;
4. Engineered Safety Features to prevent and mitigate severe accidents;
5. Engineered Safety Features to mitigate the radiological consequences and release of radioactive material in the event of an accident.

Each offers protection should the previous level of defence fail.

The concept of Inherent Safety is integral to the NSDAPs, EUR and SAPs. ONR SAP EKP1 says: "The underpinning safety aim for any nuclear facility should be an inherently safe design consistent with the operation purpose of the facility". Hazard protection applies at all levels of the Defence in Depth Framework. For example, hazards should not lead to accident conditions. Should there be a fire or similar hazard, this should not take operation beyond the normal parameters, or if it does, it should be possible to bring it back within safe operations. Any equipment required to reach safe shutdown or limit radioactive release should be protected from hazards.

Ryan then turned to discuss a hierarchical model of control. This begins with eliminating the hazard. Should this not be possible then substitution of processes, material etc. could be used to reduce the associated risk. Bellow this in the hierarchy is the use of engineering controls, followed by the implementation of administrative controls. Finally, should all prior options not reduce the risk adequately, personal protective equipment is enforced. Inherently Safe Design relies mainly on the top three elements of this hierarchy. In other words: the elimination of hazards, the substitution of hazardous materials or concepts with non-hazardous alternatives, and inherently safe or fail-safe engineered controls. If you have to rely on engineered controls then it is important to think carefully as to whether they are inherently safe.

Within nuclear facilities, hazards are considered in two ways:

- Radiological hazards from the facility that can impact on others
- Hazards that can impact upon the facility (e.g. fire).

Radiological hazards are hard to eliminate or substitute as they are an intrinsic consequence of operating a nuclear facility. Addressing such radiological hazards is normally based upon engineering controls to prevent unacceptable exposure to personnel. It is also necessary to manage the hazards to the facility and to ensure that they don't result in an accident. All control measures are applied to address such hazards, from elimination to protective equipment.

Within the UK EPR design there are several different types of Engineered

Hazard Safety Features. These are defined as:

- **Inherent** – these are pre-existing characteristics of the plant, such as its elevation above sea-level or the thickness of existing walls;
- **Static** – design features that provide a protective function without movement such as a bund. They are static in the sense that they do not need to move, and once designed against the appropriate loading etc., essentially just need to exist in order to perform the desired function;
- **Passive** – these are safety features that need to move to provide a hazard protection function, such as a blast damper or valve, but do not require a power source in order to do so. They can be fail-safe and non-fail-safe in nature;
- **Active** – design features that provide a hazard protection function, but do require a power source. They can be fail-safe and non-fail-safe in nature.

These controls form their own hierarchy with the preference for inherent safety features down to those that are non-fail-safe active features.

Ryan demonstrated the application of these protective measures in practice. The first example concerned a rainfall hazard. Problems can arise through water ingress into buildings; therefore it is important to address this hazard. An objective was set to limit the water ingress recognising it could not be prevented completely. There is a general requirement and expectation from the ONR that there should be a 1 in 10,000 year design basis that should also account for any effects of climate change over the lifetime of the facility. Rainfall hazards cannot be eliminated or substituted. Inherent and static safety features are favoured to ensure the first level of defence in depth is not challenged in a design basis event. Passive safety features, such as waterproof doors provide further defence in depth, as do active safety features such as building sump pumps and water level sensors.

The layout and topography of the plant is designed such that the drainage does not rely on any pumps or similar systems. A mixture of bunds and drainage channels ensure the water drains to the sea at the North of the site. Modelling of peak rainfall shows that critical features are protected from such rainfall hazards. A degree of optimisation was required in the design to ensure that the road layout and drainage channels perform this appropriately and the effects of the hazard are minimised.

Another example concerns the indirect consequences of an earthquake to the effluent tank building. In the event of an earthquake the objective is to limit radiological releases into the environment and ensure that all equipment required to bring the plant to a safe shutdown is available. Again, it is designed to a 1 in 10,000 year earthquake event, something which cannot easily be eliminated or substituted. Inherent, static and fail-safe passive safety features can be used to ensure that the second level of defence in depth is not challenged by the design basis event. Effluent tanks, of which there are several, were initially assumed to fail in the event of a 1 in 10,000 year earthquake. There are two potential consequences, neither of which is desirable. The effluent could leak into the environment or into an adjoining building housing important equipment required to bring the plant to a safe shutdown state. One solution is to qualify the tanks such that they are capable of withstanding the initiating earthquake, as are the related pipes, pumps, valves, etc. However, when accounting for other factors, this isn't the optimal solution. Instead a number of active and passive measures were installed including valves and pump-shutdown systems.

Ultimately there will be a number of hazard safety features across the plant. Some will provide inherent safety, some will not. Some will be active, some will be passive. It is necessary to have a way of quantifying how beneficial they are to the plant in terms of the safety benefit they deliver. Hazard Protection Schedules provide a framework for classifying safety features and their safety benefit.

In practice this is achieved by first assessing the consequences to the plant of a hazard occurring were there to be no protection. The consequences are quantified in terms of Dose Bands (the assumed radiological dose to someone off-site). The likelihood is also assessed. The assessment can then be repeated with designed safety features in place to evaluate how it will impact on the likelihood and impact.

A third example relates to coastal flooding. The IAEA Specific Safety Guide sets out the concept of a “dry-site”. This says that all items important to safety should be above the level of the design basis flood. In other words the plant should be at a sufficiently high elevation, sometimes meaning that the ground level of the site needs to be raised. This is a type of inherent safety measure. Alternative protections would mean external barriers. This raises the question of the cost of pursuing inherent safety and the ALARP basis of the legal requirements. ALARP provides a framework for quantifying the benefits (nuclear safety and more) and disbenefits of the available options, and selecting the most favourable option. In the context of coastal flooding, inherent safety generally improves with increasing site elevation while lower elevations induce the need for high-reliability barriers. Increasing site elevation can however have negative consequences on the environment, operation and construction. Deciding what course of action to follow will require a consideration of such ALARP assessments.

The third talk of the evening, *Inherently Safer Design in Offshore Oil and Gas Projects*, was delivered by **Vincent Tam**. In this talk Vincent highlighted some of the transferrable lessons from experiences within the sector.

Offshore facilities present interesting challenges, they are very compact. For example, in a typical North Sea platform, the footprint can be an order of magnitude smaller than a similar on-shore facility and as such the people are physically close to potential hazards. Escape and rescue options are limited.

In addition to the obvious hazards such as fire and explosion, there are numerous other non-hydrocarbon ones. Strong wind and waves can topple the facilities. Collision can occur with passing ships or supply boats, as can other transportation modes such as the helicopters that take people and resources on and off platforms.

Graeme Ellis set out the principles of inherently safer design, including elimination, substitution, moderation and simplification. The oil and gas industry have adapted these to: substitution, simplification, intensification and attenuation. This could also be compared to US Homeland Security interpretation for chemical security: eliminate, reduce and mitigate, and layers of protection. While the words may vary, the outcomes they are trying to achieve remain the same. They are trying to reduce the number of hazards, the number of causes and the severity of potential incidents. They are trying to reduce the scale of the consequences and the number of different consequences.

Vincent gave some examples on the reduction of the number of hazards. Substitutions could be made in terms of construction methods. Traditionally, during construction, a topside facility of a platform will be lifted into place using a crane barge. The alternative is to place the topside on a barge and tow it to location. The platform is installed onto supporting structures by adjusting the buoyancy of the barge. This provides greater stability. New technology means there could be fewer wells at the facility, helping to eliminate or at least minimise hazards. Rather than generate electricity on the facility by gas turbines, it could be powered from shore by cable. Removing the gas turbine and people required to operate it removes a potential hazard.

Examples of reducing causes include increasing the gap between the sea and the bottom of the platform, therefore removing some threat from rogue waves. Non-intrusive instrumentation can be used to avoid drilling holes in pipes minimizing the number of leak sources.

The severity of a gas explosion is related to the congestion and extent of pipework. Vincent gave an example in which the the wellheads and manifold area on a platform was designed to be spaced out, the congestion and also the severity of a potential explosion were reduced[3].

Vincent discussed the reduction of consequences with reference to Bhopal. One of the key factors in the Bhopal accident was population encroachment near the site. This is not a unique problem to India. Learning from this, a process facility was built with no land access; the only access to the site was via ferry from a separate settlement. This means that all of those who want to provide services to the site must live remotely. Any incident at the site would not affect them.

These examples sound straightforward, so why are there still problems in achieving it in practice?

The effectiveness of risk reduction effort declines through the project lifecycle. That is to say actions taken in the early stages of appraisal can reduce risk significantly by altering the design of the plant. Adopting a methodology of inherently safer design has a large scope to reduce risk. Once the design is fixed there is only scope to add in monitoring and protection systems. Once the project reaches construction stage, the risk reduction measures may be limited to procedural measures. All of these actions can reduce the risk profile, but the largest impact comes from actions to the siting, layout and design of the plant. The process facility in the previous example that did not have land access required agreement from many levels of government. It was not a decision that could be easily made or enacted during engineering design, but was achievable during the very early stage of a project

Vincent emphasised that inherently safe design is a part of hazard management. As an application process it is still evolving, but there are examples out there of good applications of inherently safe design principles.

Peter Hunt thanked the speakers for their presentations and then invited **Steve Williams** from Network Rail to make a few remarks to summarise the talks and open the question and answer session. He began by highlighting the similarities in the problems experienced by the diverse range of industries represented. He discussed Network Rail's Safe by Design initiative, as an integral part of the design process. It is the integration of hazard identification and risk assessment methods early in the design process, allowing properly thought through design to positively affect safe outcomes. We need to understand what influences safe design, and then adapt our processes and behaviours to make it instinctive. Design must consider safety over the whole project lifecycle. The focus has been on CAPEX for too long. There are many examples of poorly thought through design creating unsafe situations. An HSE review of construction accidents concluded that in 43% of the 91 fatalities they investigated the designer could have taken steps to prevent it but did not.

More information on Network Rail's Safe By Design initiative can be found on their website[4].

With this, Steve posed a question for everyone in attendance: What can you do, individually and as part of an organisation, to ensure lessons learned and good practice is shared within the wider industry?

The first question from the audience asked whether the panel had any examples of situations where a regulator or similar had asked an organisation to demonstrate that hazards had been appropriately considered and addressed during the design stage rather than simply relying on mitigation methods during the operational stage?

Ryan Atkins replied that in the nuclear industry there is a clearly expected hierarchy of controls meaning that it is expected that flammable sources are removed or equipment is outside blast radiuses.

Graeme Ellis added that the emphasis in much of the regulation does not explicitly steer towards inherent safety, but there is a requirement to demonstrate risks are as low as reasonably practicable. Most people are still at the stage of achieving this through mitigation. The COMAH regulations do have the concept of a pre-construction safety report. Some industries have a reputation for seeing safety as a cost. Often, because the investment is not available during the early stages, the latter stages are characterised by having to spend money picking up the pieces of things that could have been prevented for less during the design stage. It all comes back to mind-sets. What is the incentive for the contractor involved in design to take risks and invest in cutting-edge inherently safe design? On this point a member of the audience added that commercial drivers of the past 40 years have pushed towards contractualisation and fragmentation, both of which are seemingly at odds with the achieving inherently safe design.

The Chair for the evening then thanked the speakers a final time, before also thanking the audience and inviting them to continue their discussions over refreshments.

1. Khan, F.I. & P.R. Amyotte, 2005, I2SI: A comprehensive quantitative tool for inherent safety and cost evaluation, Journal of Loss Prevention in the Process Industries, v18:4-6, p310-326
2. Energy Institute, 2014, Guidance on applying inherent safety in design: Reducing process safety hazards whilst optimising CAPEX and OPEX, Available at www.energypublishing.org
3. VHY Tam and Coleman, S., The BP Clair Platform: A Case Study of Application of Layout in the Control of Explosion Hazards, 12th International Symposium on Loss Prevention and Safety Promotion in the Process Industries, I Chem E., May 2007
4. https://safety.networkrail.co.uk/safety/prevention-through-engineering-and-design/safe-by-design-groups/building-and-civils/

From the Secretary…

As a gentle reminder, the next **Annual General Meeting** is planned to be held at the Institution of Civil Engineers on **Tuesday 28th March 2017**, starting at 16.30. This follows previous mentions of the date in various Newsletters and also in the formal notice for the AGM sent earlier this year. A number of new members joined the Executive Committee last year and the **revitalisation** will continue at the AGM when the **results** of the **nominations for four** of the five current **trustee positions will be** on the agenda. Also on the agenda is consideration of a **new chair of the Hazards Forum**, who will need to be one of that revitalised group of five trustees. The new chair will, of course, replace the **outgoing chair**, **Rear Admiral (retd) Paul Thomas** CB FREng FCGI CEng FIMechE HonFNucI HonFSaRS, upon his **retirement** at the AGM.

Also, after ten years in the role as **Executive Secretary** of the Hazards Forum, **Brian Neale** CEng FICE FIStructE HonFIDE, has decided that the time is right **to retire** from the post, so the above AGM will be his last in that role.

Brian Neale

HSE eNews

++ £600,000 fine for Council contractor after major burns to employer ++
Gloucester Crown Court heard the 61-year-old man was working at the site on Eastgate Street on 29 May 2015. While trying to replace the traffic light pole he came into contact with a live underground cable which immediately gave him the electric shock and set him on fire. The man, who was an employee of another company asked by Amey to carry out the work, received burns to his to hands, arms, stomach, face, legs and chest. An investigation by the Health and Safety Executive (HSE) found that although this was the first time this particular group of individuals worked on an Amey project, Amey did not provide adequate information on the location of underground services in the area. The inquiry also found that Amey's supervision of the work was not adequate, and it had not properly managed the risks from the underground services.
http://press.hse.gov.uk/2017/600000-fine-for-council-contractor-after-major-burns-to-employer/

++ National furniture company fined £1m for safety failings ++
DFS Trading Limited has been fined after safety failings which led to serious neck and head injuries of a worker. Derby Magistrates' Court heard that on 02 July 2015 the worker was unloading wooden furniture frames at one of their upholstery sites, when he was struck by an unsecured furniture arm which fell from an unstable load. The impact knocked him unconscious and he suffered serious neck and head injuries. An investigation by the Health and Safety Executive (HSE) found that DFS failed to adequately manage the risks of heavy loads being moved between manufacturing sites. The court heard the company also failed to supervise the work taking place with a number of near misses being reported from unsecured loads.
http://press.hse.gov.uk/2017/national-furniture-company-fined-1m-for-safety-failings/

++ HSE launches Shared Research Project on Engineered Composite Repairs ++
The Health and Safety Executive (HSE) has initiated, and will lead, a shared research project with industry which aims to improve collective knowledge and understanding of the long-term integrity of engineered composite repairs. The extent and use of engineered composite repairs on both onshore and offshore structures has increased dramatically in recent years. Whilst such repairs have so far proven satisfactory, greater understanding is required as to their long-term performance and integrity, particularly where they may be used in safety critical applications. This 24-month project underlines HSE's ongoing commitment to partner with industry and support science and research to address a range of cross-sector safety issues. More information on other Shared Research projects can be found at http://www.hse.gov.uk/aboutus/shared-research-programme.htm

++ Warburtons fined £2m after worker fall ++
National bread makers Warburtons has been fined £2million after a worker was hospitalised following a fall. Wolverhampton Crown Court heard how on 11 November 2013 Andrew Sears was cleaning one of the mixing machines at their Wednesbury bakery, a routine job he carried out every few weeks, when he lost his footing and fell nearly two-meters. The Health and Safety Investigation found that Warburtons Limited routinely expected their workers to access the top of the mixers to clean them. The workers were often unbalanced and would brace themselves to stop from falling. The workers were not adequately supervised and there had been no training on how the mixer needed to be cleaned at height. The company failed to control the risk of falls from height when carrying out this routine cleaning activity.
http://press.hse.gov.uk/2017/warburtons-fined-2million-after-worker-fall/

Calendar of Events

Please check the Events section of the Hazards Forum website for more information at **www.hazardsforum.org.uk** and to see any updates in the calendar. These may include additional events or perhaps amendments to the Events shown below. Please note that attendance is by invitation for Hf events.

Date	Event	Venue	Contact/further information
March			
28th	Hf Event: Annual General Meeting	Institution of Civil Engineers, One Great George Street, Westminster, London, UK, SW1P 3AA	admin@hazardsforum.org.uk
28th	Hf Event: Advancing technology: the good, the bad and the ... need to manage the hazards	Institution of Civil Engineers, One Great George Street, Westminster, London, UK, SW1P 3AA	admin@hazardsforum.org.uk
29th – 30th	IET Event: Nuclear engineering for safety control and security	Aztec Hotel & Spa, Bristol, UK	http://events.theiet.org/nuclear/index.cfm?nxtId=242761
31st	SaRS Event: AR2TS deadline for submissions of abstracts	Friends House, Euston, London, NW1 2BJ	http://www.sars.org.uk/events/ar2ts2017/
April			
25th	IET Event: Internet of Things: The Security Nightmare – Hype or a Hacker's Dream	Birkenhead, UK	http://www.theiet.org/events/local/239165.cfm?nxtid
26th	IMechE Event, Hf Supported: Asset Management 2017 – Reliability Effects of Long Term Storage and Obsolescence	Institution of Mechanical Engineers, One Birdcage Walk, London, SW1H 9JJ	http://www.imeche.org/assetmanagement
May			
3rd	SaRS Event: The Future of Energy in the North of Scotland: a safety and reliability perspective	The Marcliffe Hotel, Aberdeen, AB15 9YA	http://www.sars.org.uk/events/nosdinner2017
3rd – 4th	ICE Event: Decarbonised Energy and Water Resilience	Institution of Civil Engineers, One Great George Street, Westminster, London, SW1P	https://www.ice.org.uk/events/decarbonised-energy-and-water-resilience
10th – 12th	IChemE Event: Hazards 27	ICC, Birmingham, UK	http://www.icheme.org/hazards27
16th	IET Event: Cyber security and embedded systems	Sussex University, Brighton, UK	http://www.theiet.org/events/2017/242139.cfm?nxtId=245450
23rd – 24th	IET Event: Electrical Safety Management	Birmingham, UK	http://events.theiet.org/electrical-safety/index.cfm?nxtId=245522
25th	IET Event: Cyber Crime and Prevention	Weymouth, UK	http://www.theiet.org/events/local/245325.cfm?nxtId=244447
25th	ICE Event: Wales National Energy Conference 2017	Novotel Hotel, Schooner Way, Cardiff, United Kingdom, CF10	https://www.ice.org.uk/events/wales-national-energy-conference-2017
June			
6th	IMechE Event, Hf Supported: Fit for Purpose Safety Cases in the Nuclear Industry	Birmingham, UK	eventenquiries@imeche.org
20th	Hf Event: Safety, Risk and hazards in sport (Provisional title)	Institution of Civil Engineers, One Great George Street, Westminster, London, SW1P 3AA	admin@hazardsforum.org.uk
29th	SaRS Event: Advances in Risk and Reliability Technology Symposium (AR2TS)	Friends House, Euston, London, NW1 2BJ	http://www.sars.org.uk/events/ar2ts2017/
July			
15th – 19th	ICE Event: GeoMEast 2017 International Conference	Sharm El-Sheik	https://www.ice.org.uk/events/geomeast-2017-international-conference

The Hazards Forum's Mission is to contribute to government, industry, science, universities, NGOs and Individuals to find practical ways of approaching and resolving hazard and risk issues, in the interests of mutual understanding, public confidence and safety.

The forum was established in 1989 by four of the principal engineering institutions because of concern about the major disasters which had occurred about that time.

The Hazards Forum holds regular events on a wide range of subjects relating to hazards and safety, produces publications on such topics, and provides opportunities for interdisciplinary contacts and discussions.

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