

PROCESS SAFETY News

Chilworth
Technology
the experts in process safety

2007 Issue 1

In this edition we cover the **US Baker Report on the BP Texas Refinery incident, Fire Safety reform Regulations, the US Combustible Dust Hazards Study, Handling Dusts and Powders Safely strategic guide and Chilworth courses for 2007.**



Phil Holland
Managing Director

2006 was a busy year for new regulations with the final deadline for ATEX / DSEAR coming into force last June and the new Fire Safety Order implemented in Oct 2006. For Chilworth this has resulted in an unprecedented level of demand for our expert services both in process safety consultancy and reliable and appropriate material safety data.

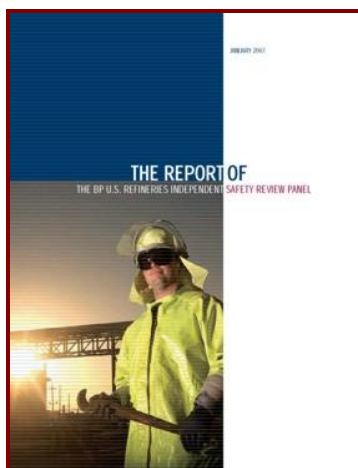
Process safety is at the forefront of corporate concern and compliance is the key to safe operation. One of the most salient lessons of the past few years is an understanding that reliance on material safety data sheets for developing a basis of safety is extremely unwise. Many industrial processes require additional safety data in order to assess the level of risk to personnel and plant. The recent study from the US Chemical Safety & Hazard Investigation Board has explained this in greater detail and is covered later in this newsletter.

It was partly the need to explain the benefits of appropriate test data and a desire for clients to appreciate the difference between testing to an acknowledged standard (where available) and reduced version testing, which prompted us to publish our free, 24 page booklet, 'Handling Dusts & Powders Safely'; again more on this later in the newsletter.

2007 looks set to be another busy year for all of us and one where the focus will be on ensuring continued compliance with current regulations and industry best practise. If you feel you are not there yet or wish to ensure continuance of professional levels of safety, make Chilworth part of your safety team.

Chilworth Expert on BP Baker Report Panel

The full Baker Report of the BP Texas Refinery accident has recently been released into the public domain.



http://www.csb.gov/completed_investigations/docs/Baker_panel_report.pdf

There have been many accidents of this magnitude before and all have been subject to accident investigations usually resulting in a determination of cause and culpability. What is remarkable about the Baker investigation is that its remit was not to investigate the loss itself but rather to look beyond the immediate cause and effect and review the corporate attitudes and culture that influenced and possibly resulted in the loss. This is one of the few times that such an enquiry has been completed by a high ranking and independent safety review panel.

As the name suggests the panel was chaired by Mr James Baker, a former Secretary of State for the US Government. One of the experts on the panel was Dennis Hendershott, (see picture)



from Chilworth Technology Inc.

The Panel was set up on the recommendation of the US Chemical Safety and Hazard Investigation Board (CSB - <http://www.csb.gov/>). The Panel's remit was to make a thorough, credible and independent assessment of the effectiveness of BP's corporate oversight of safety management systems at its five US refineries and to produce a report recommending improvements to BP's corporate oversight, safety culture and corporate and site safety management systems.

The Baker report concluded that the Corporate culture of BP in relation to HSE issues was heavily weighted towards the "H" and "E" elements with a markedly lower emphasis on the "S" and in particular on Process Safety. The panel also concluded that BP was probably not unique in this respect and that the same culture was likely to exist in other major Corporations.

There is intense interest in the Baker Report on a worldwide level. The conclusions that BP failings are probably reflected in other organisations will fuel a desire to address process safety at corporate level elsewhere, driven by corporate governance. This was certainly the aim of the investigating Panel and should be particularly applicable to industries where there is a significant exposure to catastrophic loss. The spotlight will clearly focus on other petroleum refining companies to demonstrate that they have already complied with the main recommendations contained in the Report. The issue is however much larger and must clearly include other bulk chemical manufacture, fine chemicals, pharmaceuticals and many other similar industries. Exposures to catastrophic loss would include direct harm to staff and the public, damage to the environment, loss of assets, risks of business interruption, and damage to reputation. All of these could also involve the possibility of associated litigation.

The Baker Report clearly has application

beyond the confines of US industry. It is hoped that the lessons learned from the Texas disaster will be addressed by industry worldwide. Whilst most Boardrooms have recognised the need for a corporate safety culture, they must not lose sight of perhaps the most fundamental issue of ensuring their manufacturing processes are safe and remain so.

The New Regulatory Reform (Fire Safety) Order 2006 – What's involved?

Within the UK, following on the heels of Dangerous Substances and Explosive Atmospheres Regulations ([DSEAR](#)), another piece of health & safety legislation took effect on 1st October 2006. This is the 'Fire Safety' Order 2005 (Fire Safety (Scotland) Regulations 2006 in Scotland) which will apply to all employers in industrial premises.

Where previously you may have relied on the local Fire Authority to inspect and issue a Fire Safety certificate, this will no longer happen! Instead the new regulations require you to carry out your own hazard and risk assessment and in effect self-certify your premises.



http://www.chilworth.co.uk/publication_files/FireReformTB0806.pdf

The legislation has a requirement to conduct a technically biased self-assessment, by a competent person, to demonstrate that employees are safeguarded from the risks and consequences of fire at your site. Additionally if you use 'dangerous substances' then the assessment must use principles of loss prevention, and you must demonstrate that all practical steps have been employed to minimise risks using the principles of As Low

As Reasonably Practical (ALARP).

As you will appreciate, compliance with such orders is not simply an exercise in counting fire extinguishers and determining the best means of escape; within the process industries compliance may be quite a complex task.

There is no off-the-shelf solution to your compliance needs as all industries have differing processing techniques or plant layout, often a legacy of previous production requirements. With that in mind the risk assessment needs to be tailored to your particular circumstances. Nevertheless, the key factors to be considered in the risk assessment process must include: -

- Identification of general fire hazards.
- Identification of people at risk.
- Determination of the appropriate 'General Fire Precautions'.
- Identification of 'Dangerous Substances' and their material properties.
- Review of 'Dangerous Substances' to eliminate, prevent, protect and/or mitigate associated risks in line with the principles of loss prevention.
- Determination of additional measures needed to deal with 'Dangerous Substances' using ALARP principles where necessary.
- Assessment of fire fighting and fire detection through the use of both fixed installations and manual means.
- Identification of emergency routes and exits.
- Evaluation of emergency procedures and any additional safety procedures relating to 'Dangerous Substances'.
- Assurance of suitable maintenance of equipment supplied for fire safety purposes.
- Verification that suitable information is provided to employees and others covering the risks, the preventative and protective measures employed, and the actions to be taken.
- Confirmation that all necessary training has been conducted.

When conducting the risk assessment it should be remembered that asset protection is secondary, the approach relates to personnel safety and means of escape. In complex situations, often found in the manufacturing environment, there may be significant fire and explosion hazards or difficult means of escape. It follows that it may be necessary to employ experts who have knowledge of dangerous

substances, fire development, the behaviour of people in emergency situations and the consequences of both controlled and uncontrolled fire hazards. As the legislation uses the concept of risk reduction and ALARP principles, bringing consequence, probability and cost benefit into the assessment where significant findings are identified, your ability to satisfactorily complete a fire risk assessment depends on your knowledge and experience in these areas.

The process will be considerably more complex where large quantities of 'Dangerous Substances' are utilised. Dangerous substances are considered to be flammable, explosive, oxidising, thermally unstable, reactive or materials used in such a way as to create a risk. They may or may not be classified as such for transportation purposes. They may also be in any physical form, gas, liquid or dust and used at any temperature and pressure.

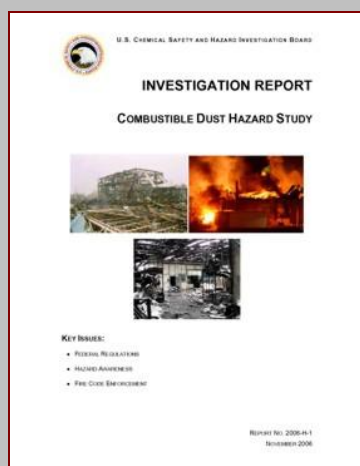
The employer has a responsibility to eliminate the use of dangerous substances wherever practicable and to minimise the risk of the use of such materials where they cannot be eliminated. There is no lower limit to the quantity of a dangerous substance for which the legislation applies and so some of the issues that will need to be addressed will include;

- the storage of combustible materials (solids, liquids and gases),
- the transport of such materials to the place of work,
- the use of such materials,
- the disposal of waste,
- the adequacy and maintenance of fire protection devices,
- the suitability of safe havens,
- the most appropriate means of escape,
- the likelihood of ignition sources,
- the potential for explosions.

This list is not exhaustive but a review shows that complex issues will arise from many unit operations and covers industries from paint spraying to food mixing. The complexity of the risk assessment process is therefore not to be underestimated and always remember that legislative compliance is a minimum standard for the protection of employees and others in the workplace. It may not necessarily translate into 'best practice' nor should it be used as a basis for protection of assets or of continuing business operation.

Dust Explosions in the Global Spotlight

At home, and abroad, dust explosions remain in the spotlight due to a number of serious incidents in recent years. Nowhere is this truer than in the US. A recently published US Chemical Safety and Hazard Investigation Board report ("Investigation Report – Combustible Dust Hazard Study", report 2006-H-1, November 2006) was instigated following three investigations by the CSB of dust explosion incidents in 2003 (West Pharmaceutical Services Inc, CTA Acoustics Inc and Hayes Lemmerz International). Chilworth Group was involved in the initial investigations of 2 of the 3 incidents which involved 14 fatalities. The CSB review concluded that over a 25 year period from 1980, there had been 281 combustible dust incidents involving 119 fatalities and 718 serious injures.



[**Investigation Report Combustible Dust Hazard Study*](#)
U.S. Chemical Safety and Hazard Investigation Board,
Report #2006-H-1, November 2006.

The investigations identified a number of common causal factors including:

- Workers and managers often being unaware of dust explosion hazards, or failing to recognise the serious nature of these hazards.
- Procedures and training to eliminate or control combustible dust hazards were inadequate.
- Dust collectors were inadequately designed or maintained to minimise explosions.
- Process changes were made without adequately reviewing them for the introduction of new potential hazards.

- Poor housekeeping leading to significant accumulations of dust and it's subsequent involvement in more damaging secondary explosions.
- Non-adherence to authoritative national standards.
- Failure of Material Safety Data Sheets (MSDS's) to effectively communicate information on the combustible nature of dusts.
- Government enforcement officials, insurance underwriters and health and safety professionals inspecting facilities failed to identify dust explosion hazards.

There are some fundamental issues raised by these conclusions for the US process industry.

In Europe, the introduction of recent explosion safety legislation provides a solid regulatory framework on which to base compliance. However, from our experience, some of the above contributory factors are equally likely to occur in Europe as well as any other part of the world.

MSDS's are inherently poor at relaying any specific dust explosion data on powders. This is primarily due to the legislation (in Europe) which determines the composition of an MSDS (European Commission Directive 2001/58/EC which is the second amendment of 91/155/EEC). This format provides no explicit requirement to detail dust explosion properties. This does not mean that companies are free from any necessity to provide such information. All suppliers of chemicals have a Duty of Care to ensure that **all** the hazards of a material are adequately relayed to their customers. In the US, there is mounting pressure on the legislative bodies to make dust explosion properties a legal requirement on MSDS's. At Chilworth, we are similarly seeing our customers requesting data specifically for inclusion in more authoritative MSDS's. These improved documents not only refer to the dust explosion hazards but also provide explicit data to facilitate the implementation of safe handling procedures.

At Chilworth, we offer a range of services in [dust explosion hazards](#) including testing, training, auditing, risk assessment, Hazardous Area Classification ([HAC](#)) and [DSEAR / ATEX](#) compliance projects. Make sure that you do not become the next statistic – engage with us to ensure compliance and best practice.

Chilworth Launch FREE Dust Hazards Booklet

Last September saw the release of our Handling Dusts & Powders Safely booklet to registered clients.

This 24 page strategic safety guide is the culmination of our recent work on [ATEX / DSEAR](#) compliance (see <http://www.chilworth.co.uk/services/dsear-atex.aspx> for further information) and a growing awareness that dust hazards are still not properly understood within the process industries. (See also the previous article on an investigation report from America.)



This guide is now available to anyone interested in developing a strategy for the evaluation of fire, dust explosion and thermal stability hazards associated with flammable dusts and powders.

As well as providing a foundation for the evaluation of powder hazards this guide also details 13 of the most frequently requested dust explosion tests. We identify the current international standard (where available) and explain the limitations of cut-down testing (reduced versions) and how they tend to decrease the accuracy of measurement and increase errors in extrapolation. We think you will find this an indispensable guide to obtaining and utilising the right data.

To register for your copy please go to our website at www.chilworth.co.uk and select the appropriate News item. Alternatively follow this link: http://www.chilworth.co.uk/contact-us/db_registration.aspx and complete the registration form.

A Special Training Experience

This year we will be holding a unique three day training event at our Southampton Headquarters.



From 11th - 13th September, we will be running a series of one day courses, focussing on different aspects of process safety with each day culminating in a tour of our facilities allowing access to our testing laboratories and a chance to talk to our safety specialists.

The programme for the event is:-

Day 1: Dust, Gas & Vapour Explosion Hazards

Day 2: Industrial Electrostatic Hazards

Day 3: Hazardous Area Classification

If you are interested in attending one or all three of our training days please call Kate Gillett in Business Development on +44 (0)23 8076 0722 to register your interest.

Alternatively you can visit our website at <http://www.chilworth.co.uk/news/events.aspx> to view these and other courses during 2007.

Chilworth IEC61508/11 Training Courses

IEC 61508/11

Day 1- SIL Determination

Day 2- Safety Instrumentation Integrity

22/23 May **Darlington**

2/3 Oct **Cork**

6/7 Nov **Birmingham**

Two complimentary one day courses:-

Day 1- (SIL) An introduction to IEC 61508/11 Safety Integrity Level (SIL) Determination principles for establishing the performance requirements and reliability of Safety Instrumented Systems.

The introduction will cover the background of IEC61508/11 SIL development requirements. The presentation will feature the current techniques for Risk Graph and Layers of Protection Analysis (LOPA), which are common methodologies within process industries.

Based on the information presented and following completion of the course, delegates should be able to fully participate in and contribute towards future SIL Determination assessments within their own workplace, using either of two widely recognised SIL determination methods.

This course is suitable for anyone who would benefit from a basic understanding of this important safety related area.

Day 2- (SII) An introduction to IEC 61508/11 Safety Instrumented Systems (SIS) Integrity which looks at the lifecycle implementation phase.

The need for a SIS will have been established from an assessment of the process risk during a Safety Integrity Level (SIL) Determination exercise (Day 1). This will have generated the functional safety requirement and the Required SIL of the SIS. The focus for the team then becomes the detailed design of the instrumented system to ensure that the end-to-end configuration can satisfy this functional safety requirement (i.e. the Achieved SIL satisfies the Required SIL).

The main thrust of this day will be to review the various phases of the SIS design process, including such aspects as system architecture, failure modes, fault tolerance, human reliability, etc., in order to achieve both performance and integrity. Additionally, management, planning and conformity assessment aspects will be reviewed. Familiarisation with the requirements of operational proof testing and maintenance of SIS, and their impact to overall functional safety management will also be addressed.

If you are interested in attending one of our events please call Kate Gillett in Business Development on +44 (0)23 8076 0722 to register your interest.

See www.chilworth.co.uk for further information on these and other services from Chilworth Technology Ltd.

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