Chilworth

Asia

Experts in Environment, Health & Process Safety

Newsletter, June 2008

2008 Issue 1

In this edition we cover MSDS and Fire & Explosion Data, HAZOP- What and Why , Measuring your process safety performance, our NEW reaction hazards and powder safety booklets, NEW office at Chennai and other news of Chilworth India such as process safety articles and workshops by Chilworth India in 1st Half of Year 2008.

Dr. Sampuran Singh
CHAIRMAN
Chilworth Group of Companies

The Chilworth Group works with clients over 70 countries from our offices around the globe and we are proud of the contribution we make in ensuring a safer working environment for all.

In 2008 we have expanded our presence in the Asian market with the opening of another office in Chennai.

We look to further consolidate our business in the Asian market by opening a process safety testing lab in India in next few months as the demand for process safety continues to grow in this region.

Chilworth group's experts were involved in the BP North American Refineries Independent Safety Panel (Baker Report) and recent reported explosions in USA plants. We have recently acquired another company in the USA and continue to expand our presence in the area of process safety.

If you need expert advice on process safety, environment and regulatory compliance, make Chilworth a part of your HSE team.

NEWS BITES

Chilworth Opens at Chennai

Chilworth group with its philosophy of providing a truly global coverage with a local presence opens its office in Chennai. With this office we hope to expand our presence in the south India region market and serve the clients better with the local presence.

L to R: Ms Amudha- Admn officer, Mr. Babu- office boy, Mr. Dhanasekar- Consulting Engineer, Mr. Senthil Kumar- Dy. Manager- Business Development, Mr. N Narayanan- Sr. Consulting Engineer

Round table workshop on

'Behavior Based Safety'

A round table workshop was conducted by Rekha Sharma of Chilworth India at Delhi in March 2008.

Round table workshop on 'Static Electricity and Dust Explosion – Is your company at risk?'

A round table workshop was conducted by T M Anand of Chilworth India at Chennai in June 2008.

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HAZOP – Brief introduction to an effective technique for Hazard Identification

Hazard identification

An approach to safety in process industries begins with the effective identification of potential hazards associated with the operation through sound understanding of the process and the materials handled. This will be followed with the identification of the likelihood of the hazard being realized, estimation of associated risk and the reduction of the risk to tolerable level.

Why HAZOP?

A number of hazard identification techniques are in practice and the choice of the most appropriate technique is a key step in being able to ensure and demonstrate the effective identification of the hazards.

Traditionally, safety in the design of process plants relied upon the application of codes & practices and checklists based on the wide experience and knowledge of professional experts and specialists in the industry. With the increasing complexity of modern plant, these traditional approaches are likely to miss some issues, which need to be considered at the design stage of a project. Hazard and Operability Studies (HAZOP) is a technique to overcome this problem and to systematically identify potential hazards and operability problems in new designs, process modifications and for the review of existing process in process industries.

What is HAZOP?

Hazard and Operability Studies (HAZOP) is a structured technique which systematically examines the deviations from the design intentions in each part of the process plants by dividing it into small sections, applying a series of guide words by a review team of knowledgeable professionals guided by a team leader. The consequential effects on the plant of each deviation judged to have a credible cause is considered by the HAZOP team and wherever the existing safeguards are deemed inadequate, the team recommends an action for change or calls for further studies of the hazard. The associated risk is ranked based on the consequences and the credible causes and the whole discussions are recorded in the form of HAZOP worksheets.

The success of the HAZOP study highly depends on the quality of the study team which requires experienced practitioners and straddling a variety of disciplines is required to achieve a thorough and balanced view of the process hazards.

Chilworth has carried out HAZOP for more than 100 reputed companies engaged in the field of Oil & Gas, Chemicals, Petrochemicals, Food, Bulk drugs and Pharmaceuticals in India. Our expertise in the field of process safety will lead the study beyond the standard accepted ambit especially in identifying special hazards like electrostatic caused ignitions, dust explosions, gas/vapour flammability and runaway chemical reactions, thermal instability which is normally overlooked.

Chilworth Latest Technical Publications:

Strategic guides– comprehensive tools covering key aspects of process safety:

- ✓ chemical reaction hazards & thermally unstable substances -a strategic guide to reaction hazard assessment
- ✓ handling dusts and powders safely – a strategic guide to characterization and understanding

Process safety articles

By Ravi Hariramani of Chilworth India, on Process Safety Management, published in February 2008 edition of Chemical Engineering World.

By Dr. Steve Rowe of Chilworth UK and T M Anand of Chilworth India, on Basis of Safety in Process Plants, published in June 2008 edition of ICC Chemical News.

A free PDF version of these guides is available on request. To obtain your copy, please contact Chilworth offices in India.

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DOES THE MSDS PROVIDE SUFFICIENT FIRE AND EXPLOSION HAZARD DATA RELEVANT FOR YOUR PROCESSES AND OPERATIONS?

MSDS's are probably the most frequently quoted source for identifying the hazards of chemicals. Among the other hazards, the Hazard Communication requires that the physical hazards of a chemical – including the potentials for fire, explosion, and reactivity should be contained in the MSDS.
The Manufacture, Storage and Import of Hazardous Chemical Rules [MSIHC Rules], 1989 – recommends a MSDS which contains 10 sections with specific titles for each section. Section 3 of its MSDS is about the fire and explosion hazards of chemicals:

3. FIRE AND EXPLOSION DATA

Flammability yes/no	LEL __%	Flash point __°C	AIT__°C
TDG flammability	UEL __%	Flash point __°C	Hazardous Combustion products
Explosion severity to impact		Explosion sensitivity to static electricity	
Hazardous Polymerization			
Combustible liquid	Explosive material	Corrosive material	
Flammable material	Oxidizer	Others	
Pyrophoric material		Organic material	

It is necessary that when evaluating a hazard of a chemical, the available scientific evidence concerning such hazard should be identified and considered. When evaluating the fire and explosion hazards of a chemical, it is very important not only to characterize the fire and explosion hazards under normal conditions but also, as emphasized in this article, to evaluate its hazards under actual process conditions. The following are some remarks about fire and explosion hazards of chemicals:

- ✓ It is very important to make it clear and to note the conditions under which the fire and explosion hazard data are obtained. It is important to consider that the process conditions can have profound effects on the flammability characteristics.
- ✓ When 'not applicable' is used, the conditions under which the hazard property e.g. flash point is not applicable should be specified.
- ✓ The classification of flammable and combustible liquids is merely based on the flash point of the chemical. One should not lose sight of the fact that as long as the temperature is above the flash point of a liquid, the liquid is flammable no matter whether it is "Flammable" or "Combustible".
- ✓ Some chemicals do not flash in the recommended standard flash point testers, however, they do burn in other vessels. Chemicals such as dichloromethane cannot be ignited and propagate flame in most of the recommended flash point testers. However, these chemicals can burn i.e. they are combustible. Therefore, the flash point alone cannot adequately describe the fire and explosion hazards of these chemicals.

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HOW DO YOU MEASURE YOUR PROCESS SAFETY PERFORMANCE?

Many organizations rely heavily on failure data to monitor the performance. The consequences of this approach is that improvements or changes are only determined after something has gone wrong. Often the difference between a system failure results in a minor or catastrophic outcome is purely down to chance. Effective management of major hazards requires a proactive approach to risk management, so information to confirm critical systems are operating as intended is essential.

The main reason for measuring process safety performance is to provide ongoing assurance that risks are being adequately controlled. Directors and senior managers need to monitor the effectiveness of internal controls against business risks. For major hazard installations and chemical manufacturers, process safety risks will be a significant risk, asset integrity and reputation. Many organizations do not have good information to show how well they are managing major hazard risks. This is because the information gathered tends to be limited to measuring failures, such as incidents or near misses.

Discovering weaknesses in control systems by having a major incident is too late and too costly. Early warning of dangerous deterioration within critical systems provides an opportunity to avoid major incidents. Knowing that process risks are effectively controlled has a clear link with business efficiency, as several indicators can be used to show plant availability and optimized operating conditions.

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Chilworth can provide you with guidelines to identify the **leading and lagging process safety performance indicators** which would enable the organization to assess its actual process safety performance.

Lagging Indicators

These can be termed as reactive monitoring systems;

- Requires reporting & investigation of specific incidents and events to identify the weaknesses (Number of incidents of loss of containment of hazardous material, failure of safety critical plant due to corrosion, wear or damage, Number of expected failure or breakdown of safety critical plant due to components wearing out)
- Not necessary to have an injury, loss of containment or any damage
- It shows that the desired safety outcome has failed or not been achieved
- These indicators provide feedback of the process safety on the basis of events that have already occurred
- Corrections are devised on the basis of the recorded events through root cause analysis

Leading Indicators

These can be termed as active monitoring systems;

- Focusing on few critical Risk Control Systems (Work Permits, Maintenance, Trainings etc)
- Require routine systematic check
- Considered as measures of process or inputs essential to deliver the desired safety outcome
- These are recording of events that can in a later date be a cause of process safety incident
- Corrections are made to comply to the indicator requirements to prevent failures

Examples of few **process safety indicators** which can be considered for monitoring of the process safety performance are;

- number of overdue inspections and tests
- number of uncontrolled releases
- completion of Major Accident Risk assessments
- overdue process safety action items,
- overdue management of change reviews,
- overdue incident investigations,
- overdue inspection work requests,
- temporary repairs,
- and critical alarm compliance

The method of setting the above indicators requires those involved in managing process safety risks to ask some fundamental questions about their systems, such as;

- What can go wrong
- What controls are in place to prevent major accidents
- What does each control deliver in terms of a **"safety outcome"?**
- How do we know they continue to operate as intended?

Measure your process safety performance now and gain an increased assurance on your risk managements systems and process safety performance.

MSDS AND FIRE AND EXPLOSION HAZARD DATA

.....Continued from page 03

✓ As noticed above, dust explosion hazards are treated as optional flame properties. Many combustible chemicals are in solid state and fine particles (dusts) are produced during manufacturing, processing, transportation and storage. As a matter of fact, dust explosion hazard poses a significant threat to the safety of industrial processes and operations. Therefore, the dust explosion hazards of a chemical in the solid form should be thoroughly and adequately characterized.

Finally, if the hazard data provided in the MSDS are not sufficient or not relevant for characterizing the fire and explosion hazards in the specific process or operation, the data should be obtained with adequate test methods.

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