

We would love to hear from you....

Please do contact Helen Conlin, Newsletter Editor at slpsgecm@ichememember.org about contributing articles or providing feedback and comment on: Good practice, previous SIG events, outreach (e.g. support to Universities, other institutions), or anything else that you think our readers would find interesting.

Introduction

Welcome to the 2nd edition of the relaunched S&LP SIG newsletter.

This issue includes articles on [Member Feedback](#), the S&LP SIG [Member Survey Topics of Interest](#), [Process Safety News](#), [S&LP SIG Events](#), [Ammonium Nitrate](#), an [Incident Round-Up](#) and the [S&LP Committee](#).

Member Feedback

We were delighted to receive feedback on the Emerging LNG Uses topic included in the first Newsletter.

The point was raised that LNG had been used as fuel in shipping on LNG carriers for many years, with boil off from evaporative cooling used to keep the cargo chilled, being fed to the engines.

The criticality of fuel system integrity was highlighted due to the enclosed spaces within ships.

This feedback reinforces the need for hazard knowledge and expertise in existing LNG applications to be shared and applied within emerging LNG uses, such as other

forms of shipping where crew will be less familiar with LNG hazards and operations.

Member Survey – Topics of Interest

23% of respondents indicated interest in attending an S&LP SIG event on risk management in the process lifecycle and further respondents indicated interest specifically in functional safety and in process validation and verification.

The S&LP SIG has formed a working group on Functional Safety Management (FSM) which will explore the overlap and differences between FSM and Process Safety Management (PSM) requirements. Both cover the process lifecycle and apply a systems based approach.

Below is a conceptual diagram for thinking about the relationship between PSM and FSM.



For each FSM requirement, the aim is to develop technical notes for each element covering:

- ❖ Good Practice;
- ❖ Myths; and
- ❖ Pitfalls.

If you wish to participate in the FSM topic, please contact us at slpsgecm@ichememember.org.

Process Safety News

Incident Analysis

There is a new publication on chemical incidents from the Dutch National Institute for Health and Environment (RIVM).

'Fifteen years of incident analysis: Causes, consequences, and other characteristics of incidents with hazardous substances at major hazard companies in the period 2004-2018.'

You can download the publication from this link:

<https://www.rivm.nl/publicaties/fifteen-years-of-incident-analysis-causes-consequences-and-other-characteristics-of>

One of the publication authors, Martijn Mud, passed away this year, sincerest and deepest condolences to all who knew him. A great loss.

Standards

S&LP SIG Vice Chair Clive de Salis is the IChemE representative on Conformity Assessment of Safety Systems (CASS). Clive's August report from CASS highlighted:

Cyber Security – IEC 62443 (Security for industrial automation and control systems) has been designated by the EU as a European Norm. Therefore, standards bodies throughout the EU (including UK plus Norway) will start printing the standard as EN 62443 Parts 1 to 4. Work on the large group of Cyber standards that is IEC 62443 continues.

Cyber and IEC61511 – IEC 61511 needs full compliance with Part 1 of the standard to claim anything as SIL (Safety Integrity Level) rated. It is Parts 2 and 3 that are guidance, but not Part 1. IEC 61511 Part 1 Clause 8.2.4 requires security risks to be included and Part 1 section 12.4.2 makes clear that the security assessment should include Cyber risks, at least to the communications.

The problem is that it is not clear how to do a SIL assessment for Cyber.

Clive has concluded from experience to date, that any SIL assessment can only be qualitative

as there is virtually no accurate quantitative data for cyber available yet. Therefore, Clive has used IEC61511 Part 3 Annex I to design and calibrate a SIL assessment system specifically for Cyber. Currently, there is no annex in Part 3 specifically for Cyber. However, absence is not an excuse to do nothing when Part 1 requires something be done.

S&LP SIG Events

HAZARDS

The S&LP SIG will have a virtual stand at HAZARDS 30, 26th to 27th November 2020.

We would be delighted to meet and talk with members via live video and text chat. We will have information available for all SIG key topics.

<https://www.icheme.org/career/events/ Hazards-30/>

Deepwater Horizon – 10 Years On

2020 is the tenth anniversary of the Deepwater Horizon incident which began on 20th April 2010.

On Tuesday 8th December 2020 from 12:30 until 13:30 (UTC); the S&LP SIG and SONG (Oil and Natural Gas SIG) are jointly hosting a webinar featuring Professor Geoff Maitland (Professor of Energy Engineering at ICL and IChemE Past President) and Katy Heidenreich (OGUK Operations and Supply Chain Director).

Further information will be available shortly on the S&LP SIG website.

Digitalisation and Process Safety

The S&LP SIG is hosting a series of webinars on digitalisation and process safety in Quarter 1 2021. This webinar series will explore the opportunities and challenges that digitalisation provides for process safety. The implications for:

- ❖ Management systems,
- ❖ Risk assessment,
- ❖ Equipment reliability,
- ❖ Cyber security,
- ❖ Human factors,
- ❖ Emergency planning; and
- ❖ Incident investigation;

will all be discussed and explored.

Online booking for this event will open before the end of 2020 at the link below:

<https://www.icheme.org/process-safety-a-digitalised-world>

Focus on Ammonium Nitrate (AN)



Credit: diplomedia /Shutterstock.com

Above is an aerial photo of the recent AN explosion in Beirut which has focused attention on AN storage. AN is widely used as a fertiliser ingredient manufactured in large quantities as pellets or prills for global annual use, with 33% of production in Europe. This article is a general comment on major hazards of AN, not based on any specific information about the Beirut explosion.

Pure AN is a crystalline solid with low melting point (170°C) which decomposes on further heating (there is no boiling). The decomposition is explosive if the AN is confined.

As supplied, AN and many AN mixtures are classified only as oxidising agents (not as toxic or explosive, if classified at all), because decomposition or detonation of the material as supplied requires physical change (e.g. liquefaction or contamination) or extreme shock. However, the potential decomposition when exposed to heat, fire, confinement and /or contamination, presents the major hazards. There can be potential for self-sustaining decomposition (SSD) with evolution of toxic gases (principally nitrogen oxides) and /or detonation, depending on the composition and conditions. This article highlights the detonation hazard, evident in Beirut.

Many mixtures have low propensity for detonation as supplied. However, where there is any propensity for detonation then a severe enough shock (e.g. deliberate use of explosives, detonation of a sensitised portion, or melting, confinement and detonation of AN) can possibly communicate detonation through a stack of bulk (loose or bagged) material. The communication is not easily predictable by bench scale tests. A

century ago, it was common practice to use deliberate blasts to clear 'caked' AN, usually without incident and based on extensive but uneventful testing.

Despite regulation of the supply, storage, and transport of AN, incidents still occur. A detonation in Toulouse in 2001 caused 31 fatalities and many injuries (hospital visits for over 2,000), leading to revised Seveso Directive thresholds for AN mixtures, in particular for contaminated or off-spec. material [1].

Review of twenty five AN incidents [3] highlighted two main concerns:

- ❖ Poor safety management systems around storage and handling of AN fertiliser.
- ❖ Challenges of safe storage and handling of AN, particularly in the training of operatives and responders and their awareness of hazards – there is a stark difference between the hazard classification as supplied and the hazard potential in accident conditions (toxic release, explosion).

Guidance on the management of the detonation hazard is provided within references 4, 5, 6 and 7 linked below. Linked reference 2 provides information on the West, Texas incident in 2013.

References

- [1] <https://www.icheme.org/media/14633/toulouse-incident-summary-21-sep-01.pdf>;
https://www.aria.developpement-durable.gouv.fr/wp-content/files_mf/A21329_ips21329_008.pdf
- [2] <https://www.icheme.org/media/14598/west-incident-summary-17-apr-13.pdf>;
<https://www.csb.gov/west-fertilizer-explosion-and-fire/>
- [3] <https://www.icheme.org/knowledge/loss-prevention-bulletin/free-downloads/articles/articles/>
- [4] <https://www.legislation.gov.uk/ukxi/2003/108/2/made>
- [5] https://www.fertilizerseurope.com/wp-content/uploads/2019/08/Guidance_for_the_storage_handling_and_transportation_of_solid_mineral_fertilizers.pdf
- [6] <https://www.hse.gov.uk/pubns/indg230.pdf>
[Note: not updated since the Seveso II Directive]
- [7] <https://www.gov.uk/government/publications/secure-your-fertiliser/secure-your-fertiliser>

Incident Round-Up

Unfortunately, technical (process) safety incidents continue to occur. As loss prevention and process safety professionals, we continue to learn in order to prevent more in future. The following incidents have occurred since the last Newsletter. Please contact Richard Mundy slpsgwebmaster@icheme.org, if you would like to highlight a recent incident.

[Beirut Port Ammonium Nitrate Explosion, 4th August, Lebanon](#)

Very large explosion of AN prills stored in a warehouse. 178+ fatalities, 6,000+ injured, US\$15 bn of damage estimated.

[Corpus Christi Propane Pipeline Rupture, 21st August, USA](#)

Dredging vessel strikes submerged propane pipeline, breaching it in two places, leading to fire. Four fatalities, barge sank.

[Llangennech Rail Tanker Derailment, 26th August, UK](#)

Derailment following some brakes inappropriately becoming applied. Spillage of 330m³ of diesel. Fire and pollution of the River Loughor.

[Westlake Chlorine Release, 27th August, USA](#)

Fire and chlorine release from site making trichloroisocyanuric acid. Cause likely to relate to Hurricane Laura.

[Hazira Gas Plant Fire, 24th September, India](#)

Fire at plant receiving gas from offshore. Supplies to major gas users reduced, leading to shutdown of two power stations.

[Hull Waste-to-Energy Plant Fire, 26th September, UK](#)

Fire in a concrete feed bunker. Smoke affects neighbours over three days.

[Tianmen Pharmaceutical Intermediates Plant Explosion, 28th September, China](#)

Explosion at fine chemicals facility, whilst a plate and frame filter press was being tested. Five fatalities.

[Dunedin Sulphur Dust Flash Fire, 5th October, New Zealand](#)

Flash fire of sulphur dust whilst an old hopper was being removed. Five workers injured.

S&LP Committee

The S&LP SIG committee last met on 16th October.

Planned future S&LP SIG committee meeting dates:

- ❖ 18th December
- ❖ 19th February 2021
- ❖ 16th April 2021
- ❖ 18th June 2021

If you have something for the committee to consider, please contact Andy Rushton, Chair, at slpsgchair@ichememember.org.

We are grateful to those who take the time to contribute to the S&LP SIG Newsletter. Please note that content and opinions are those of the contributor(s) (or in resources accessed online) and do not necessarily reflect the views of the Safety & Loss Prevention Special Interest Group Committee or the Institution of Chemical Engineer