

**What is going wrong with PSM
- 36 years after Bhopal**

**First Jordanian International
Chemical Process Safety
Virtual Conference**

March 30th and 31st, 2021

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Before we start.....

 Emergency exits, Covid 19 precautions

 - Please ensure your microphone is on mute when presenter is speaking

- Q and A after presentation

 No audio or video recording of this presentation, please

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About me.....

- Chemical Engineer, 41 years experience in operations, technical services and process safety
- Investigated root causes and human factors in many chemical process related incidents
- Consultant in PSM since 2001. Provided PSM implementation services to over 100 organizations in India, Germany, Greece, Malaysia, Indonesia, South Africa, Israel, Jordan, Abu Dhabi, Oman and Bahrain
- Conducted over 450 audits of Process Safety Management Systems, many HAZOP studies and has trained over 12,000 leaders and management staff in PSM.

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AICHE American Institute of Chemical Engineers

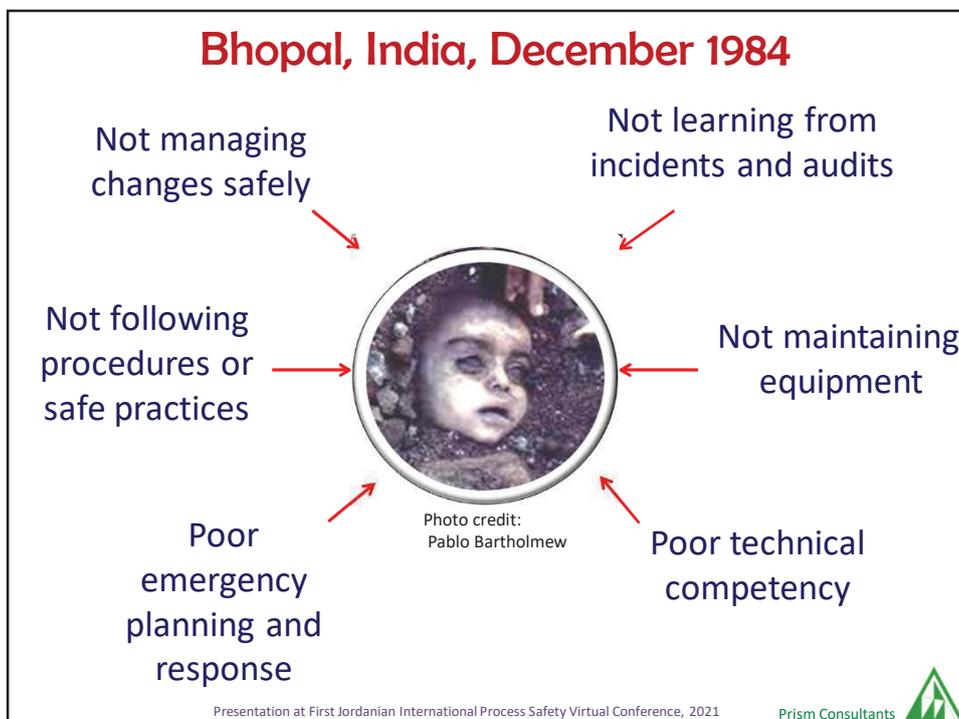
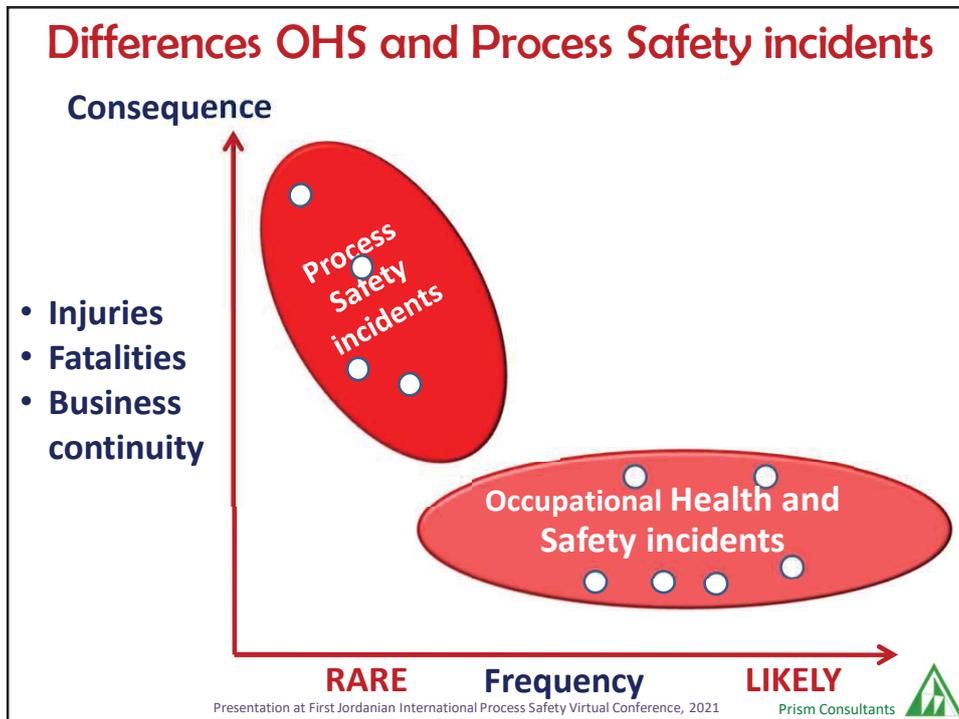
Articles published in CEP Magazine

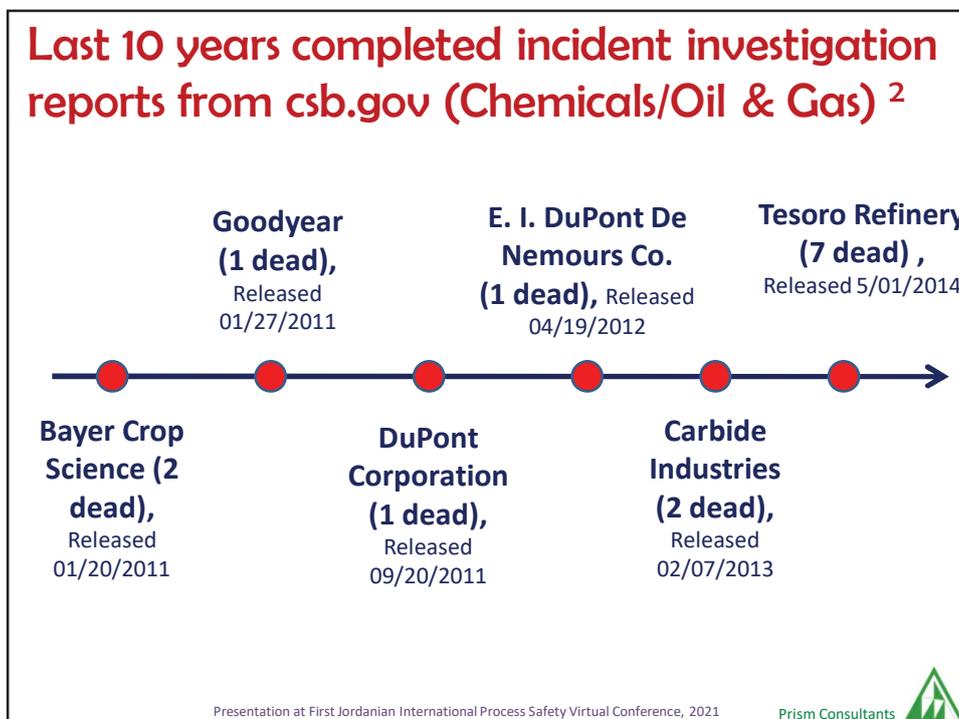
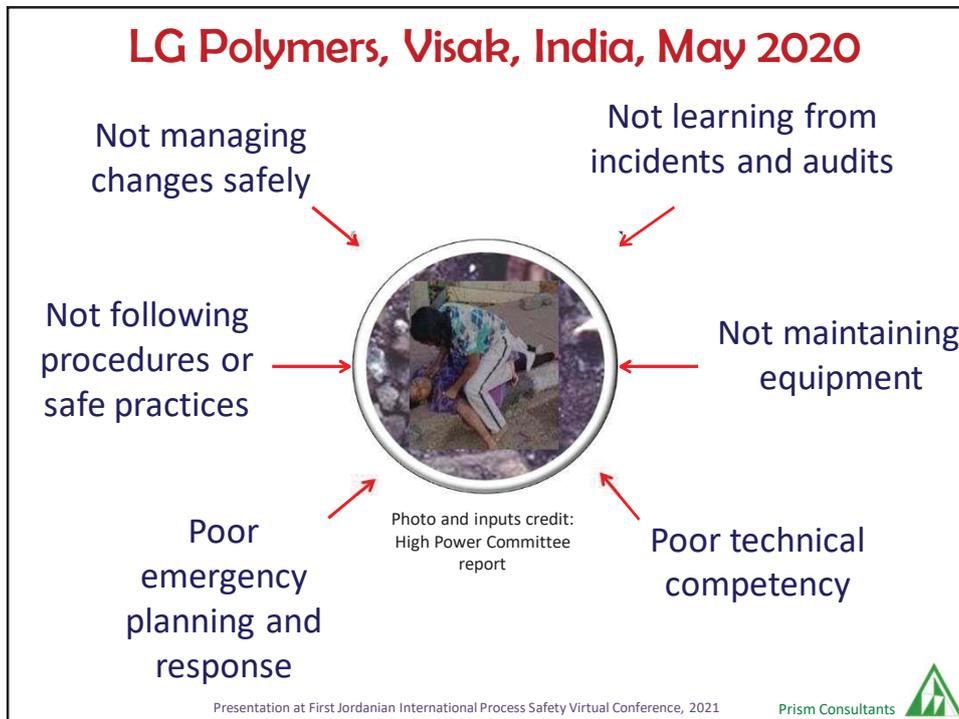
Sept 2015
Moving Process Safety into the Board Room
S. RAJESHEKAR
PRISM CONSULTANTS
Top management is often unfamiliar with the high-risk process safety decisions being made on a daily basis by plant managers. Incorporate this method into your management of change (MOC) procedure to ensure that all decisions are consistent with your organization's risk-tolerance level.

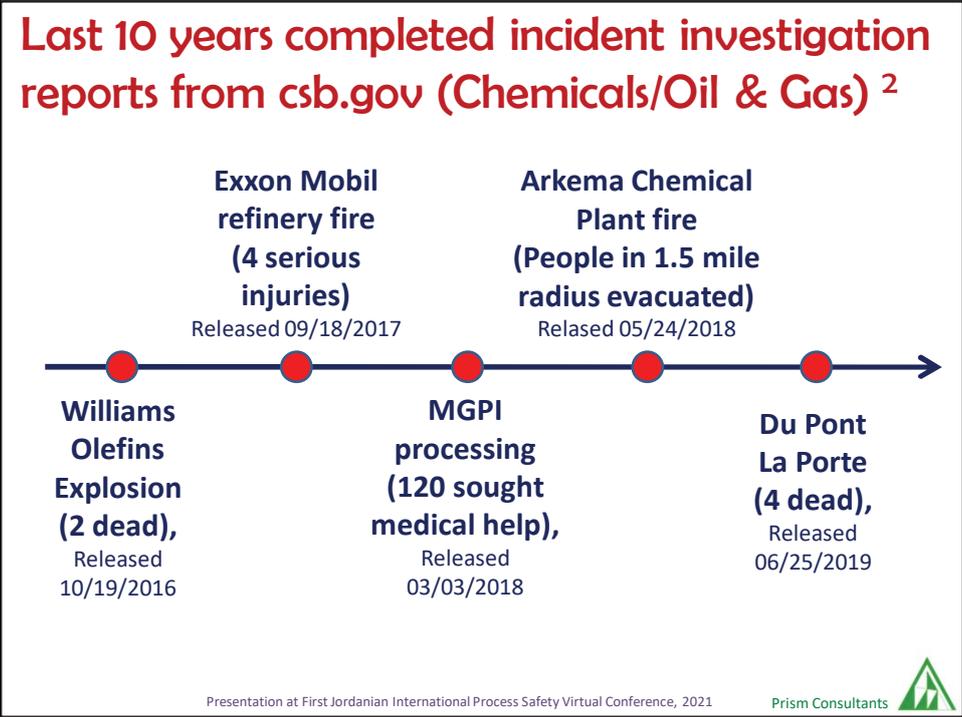
March 2019
Risk-Based Process Safety
What happens when organizations don't follow risk-based process safety guidelines?
S. KARTHICKAN
PRISM CONSULTANTS

Jan 2020
FLARE SAFETY

Jan 2021
CEP Understand Process Hazards to safely manage them







Why are things still going wrong?



HSE UK report on the Buncefield oil depot fire (2005) investigation³:

"This report does not identify any new learning about major accident prevention. Rather it serves to reinforce some important process safety management principles that have been known for some time:

- 1. There should be a clear understanding of major accident risks and the safety critical equipment and systems designed to control them.*
- 2. This understanding should exist within organisations from the senior management down to the shop floor*

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HSE UK report on the Buncefield oil depot fire (2005) investigation³:

- 3. There should be systems and a culture in place to detect signals of failure in safety critical equipment and to respond to them quickly and effectively.*
- 4. Time and resources for process safety should be made available.*
- 5. The pressures on staff and managers should be understood and managed*

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HSE UK report on the Buncefield oil depot fire (2005) investigation³:

6. *There should be effective auditing systems in place*
7. *At the core of managing a major hazard business there should be clear and positive process safety leadership with board-level involvement and competence to ensure that major hazard risks are being properly managed"*

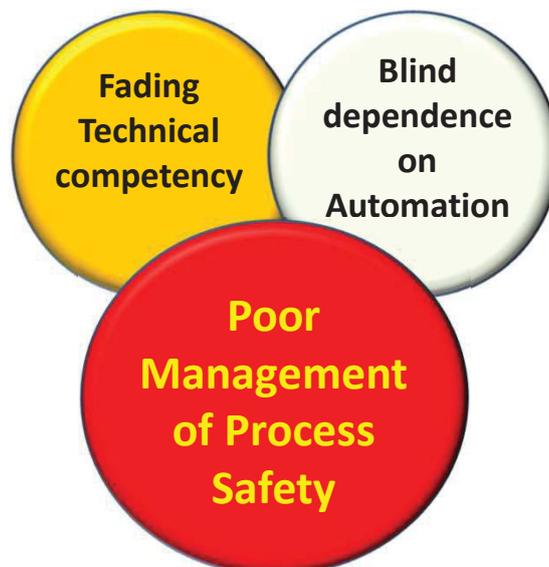
But why are these not happening?

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My Take on What is going wrong with PSM?



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What is going wrong with PSM?

Fading Technical competency

- Poor quality of Process Hazard Analyses, MOC's and audits
- Lack of technical approach at strategic decision making levels

Causes:

- Greening of workforce - job hopping – retirements - Fresh Chemical engineers preferring other sectors
- **Paper Safety Management (PSM??) – Overly depending on complicated PSM systems⁴**

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What is going wrong with PSM?

Blind dependence on automation

- **“Automation Addiction”** – borrowing a phrase from the aviation industry
- **Automation Overload:** It is more important to identify what you DO NOT want! Example: Alarms!
- **Jargonisation of Process Safety** - “Smart” / “Intelligent” technology – the name implies that Humans are not smart/intelligent but technology is!
Technology can only be an enabler

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Poor Management of Process Safety

What is going wrong with PSM?

Process Safety **Mis**management

New breed of **Virtual Plant Managers with process safety dashboards**

Plant Managers need to spend more time in the Plant!

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Poor Management of Process Safety

What is going wrong with PSM?

Process Safety **Mis**management

- *“The refinery process safety culture required proof of danger rather than proof of effective safety implementation” – CSB refinery incident report*
- Discontinuity in Leadership
- Organisational risk diffusion

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What is going wrong with PSM?

Poor Management of Process Safety

What is organisational risk diffusion?

The diagram illustrates the concept of organisational risk diffusion. It features a red circle on the left containing the text 'Poor Management of Process Safety'. Below this, a box labeled 'Engineer's perception of process safety risk' is connected by a series of four chevron arrows (red, yellow, light blue, and white) to a box on the right labeled 'Management's perception of process safety risk'. This visualizes how risk perception spreads from those with technical competence to those without.

Engineer's perception of process safety risk

Management's perception of process safety risk

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Organisational risk diffusion

Perception of Process safety risk is directly proportional to technical competence

“They did not know what they did not know” – Late Dr Trevor Kletz

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What is the solution – voluntary or regulatory?

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Voluntary Initiatives

- Management can voluntarily assess the effectiveness of the process safety risk communication
- Add **“Effectiveness of process safety risk communication”** as part of Responsible Care[®] management system

Drawbacks of voluntary initiatives:

- Public are skeptical of any self certification by an Industry body (awarding of RC logo etc)

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Is there a regulatory solution?

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CSB Investigation recommendation for BP Texas City incident (2005)⁵

“Appoint an additional non-executive member of the Board of Directors with specific professional expertise and experience in refinery operations and process safety. Appoint this person to be a member of the Board Ethics and Environmental Assurance Committee.”

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BP's action on the recommendation⁵

“BP took a number of affirmative steps to meet this goal:

1. Implementation of a Safety, Ethics and Environment Assurance Committee (SEEAC) and senior management to monitor process safety regularly, by evaluating thoroughly a range of leading and lagging safety indicators.
2. The Board also added several directors with backgrounds and expertise related to the effective oversight of process safety in BP's refinery and other businesses.

BP's action on the recommendation⁵

3. BP is also using an independent refinery process safety expert to advise the SEEAC of the group's goal of becoming an industry leader in process safety and
4. its progress in bringing BP's Operating Management System (OMS) to life (including process safety risk assessments, process safety culture, and trending process safety performance).”

Is there a regulatory solution?

Suggestion:

Mandatorily include a Technically Competent Director on the boards of chemical organisations who can explain the risks to other directors



References

- [1] Lees' Loss Prevention in the Process Industries Vols 1-3, 3rd Edition, Butterworth-Heinemann
- [2] Chemical Safety Board, USA, <http://www.csb.gov/investigations/completed-investigations/?Type=2>
- [3] Control of Major Accident Hazards: Buncefield – Why did it happen? <http://www.hse.gov.uk/comah/buncefield/buncefield-report.pdf>
- [4] Process Safety Management India, <http://indiaprocesssafety.blogspot.com>
- [5] <http://www.csb.gov/bp-america-refinery-explosion/>



Thank you!
Questions?

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