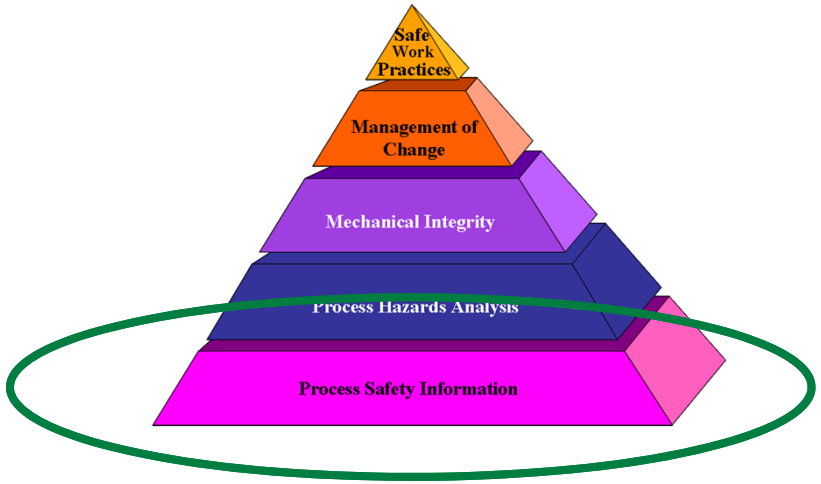
Process Safety Information



Safety Gala – Management Force Group

H. Vaudrey – DEKRA – 24th May 2012

Introduction

- Scope / Brief
- Commercial ?
- Mixed audience ?
- Best practice PSI ?

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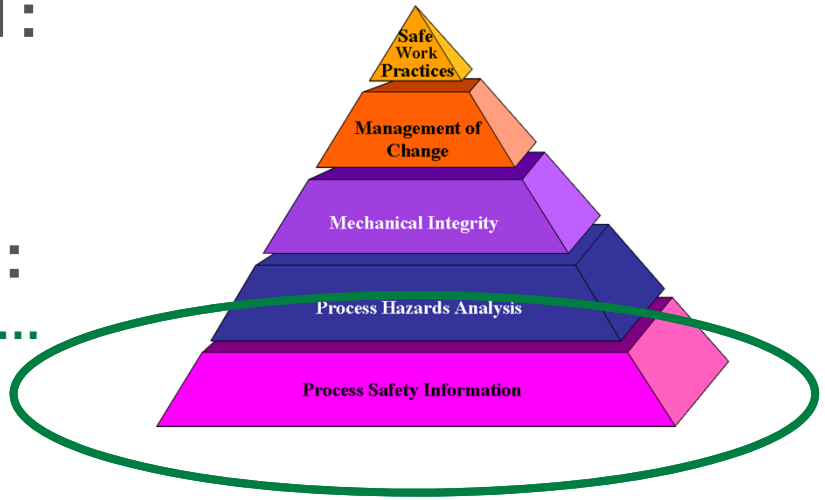
What is PSI ?

- **PROCESS SAFETY:**
  - A discipline – main focus Major Hazards
  - Different from safety at work

- **PROCESS SAFETY MANAGEMENT:**
  - Systems – set of elements/chapters

- **PROCESS SAFETY INFORMATION:**
  - Documentation : reports, drawings, records, …



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Incidents than define Process Safety

YEAR	WHERE	EVENT	FATALITIES	
1966	Feyzin, Francia	Bleve de GLP	18	
1974	Flixborough, UK	Fuga ciclohexano	28	
1976	**Seveso, Italy**	**Fuga dioxinas**	**1**	
1982	Ocean Ranger, Canadá	Plataforma offshore	84	
1984	México	Bleve de GLP	600+	
1984	**Bhopal, India**	**Fuga isocianato metilo**	**20000+**	**BANKRUPT**
1986	*Challenger*	*Nave espacial*	*7*	
1986	*Chernobyl, USSR*	*Planta nuclear*	*100+*	
1986	Sandoz, Bale, Switz.	Incendio almacén	0	
1987	Texas City, USA	HF leak	0	
1988	**Piper Alpha, UK**	**Plataforma offshore**	**167**	
1988	Norco, USA	Fuga propano	7	
1989	Pasadena TX, USA	Fuga etileno / isobutano	23	
1992	La Mède, France	Fuga gasolina / GLP	6	
1994	Milford Haven, UK	Fuga en unidad FCCU	0	
1998	Longford, Australia	Fuga GLP	2	
2001	**Toulouse, France**	**Explosión AmmoNitrate**	**30**	**> 100 M€**
2001	Petrobras, Brasil	Plataforma offshore	11	
2003	*Columbia*	*Nave espacial*	*7*	
2004	Skikda, Algeria	Fuga en planta GNL	27	
2005	**Texas City, US**	**Fuga en unidad ISOM**	**15**	**265 M$**
2005	**Buncefield, UK**	**Oil depot fire**	**0**	**1 BILLION £**

…. NEVER ENDING STORY / NOT UPDATED WITH DeepWater Horizon, Fukushima, …

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Process Safety vs. Occupational Safety

PERSONAL SAFETY	PROCESS SAFETY
• Slips, Trips and Falls	• Toxic release, chemical runaway, explosions, fire
• Near Miss, First Aid, Recordable Injury, Lost Time, or Fatality involving an single employee	• Multiple injuries or fatalities, Interruption of production capability, Major damage to property, environment, and corporate image, Impacts the community
• Often, low impact high frequency	• Potentially catastrophic, low frequency
	• Require specialist knowledge and training

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Elements of PSM system – from CCPS

- **Commit to Process Safety**

1 Process Safety Culture
2 Compliance with Standards
3 Process Safety Competency
4 Workforce Involvement
5 Stakeholder Outreach

- **Understand Hazards and Risk**

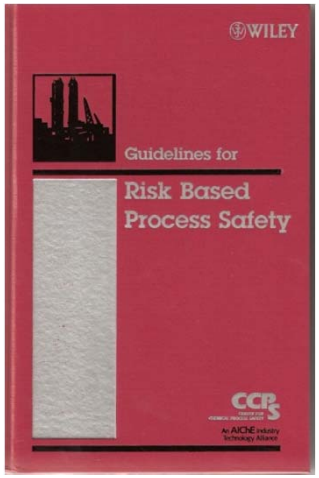
6 Process Knowledge Management
7 Hazard Identification and Risk Analysis

- **Manage Risk**

8 Operating Procedures
9 Safe Work Practices
10 Asset Integrity And Reliability
11 Contractor Management
12 Training And Performance Assurance
13 Management of Change
14 Operational Readiness
15 Conduct of Operations
16 Emergency Management

- **Learn from Experience**

17 Incident Investigation
18 Measurement and Metrics
19 Auditing
20 Management Review and Continuous Improvement

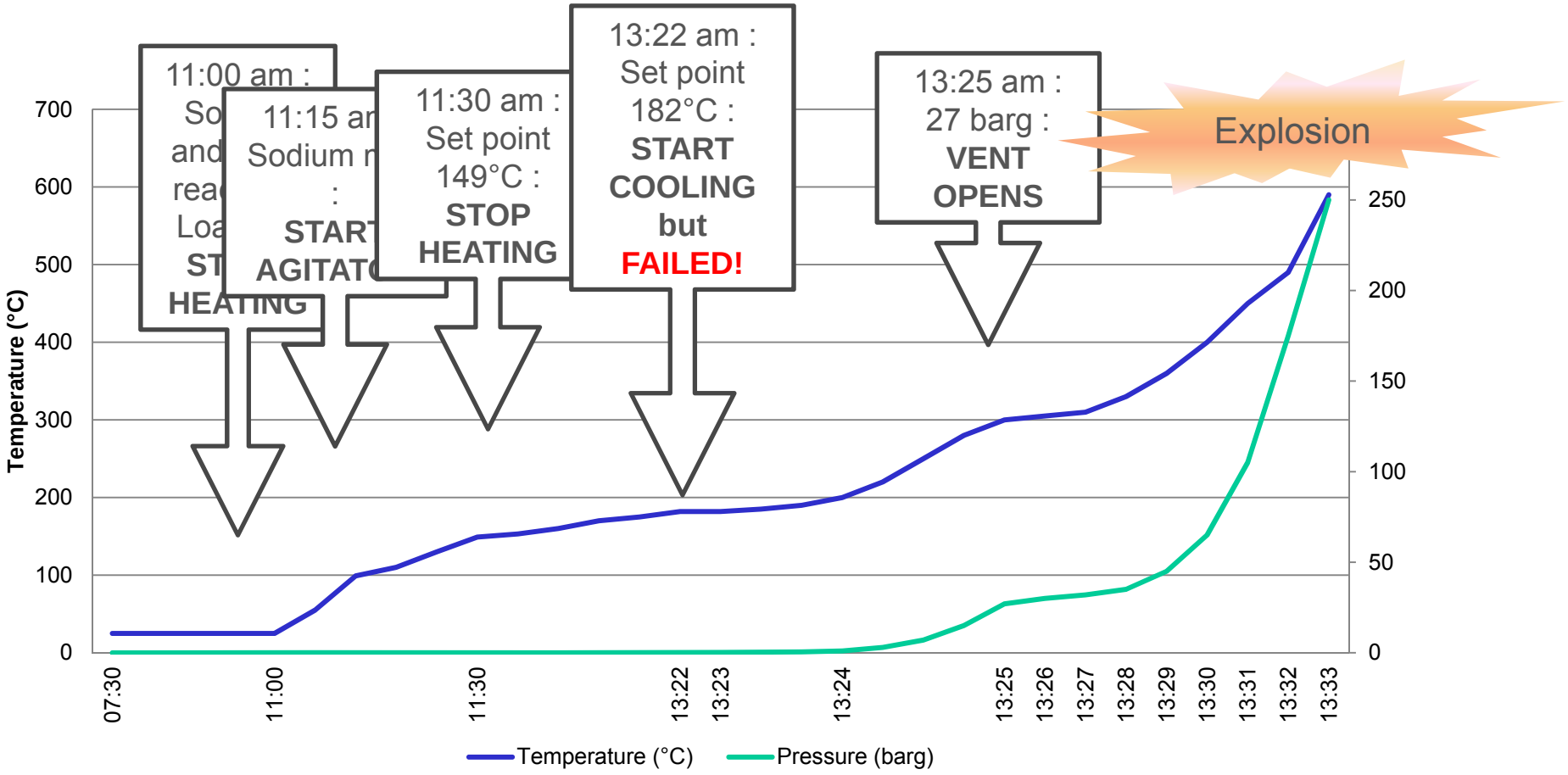


Process Safety Culture – Main elements

- Facilitate the clear **commitment of corporate management** to:
  - verify that a **PSM system is in place and is operating effectively**
  - ensure that this system is consistent with industry and regulator best practice
- Involve all relevant stakeholders in developing a **positive, trusting, and open** process safety culture in all company facilities
- Define expectations and **accountability for process safety performance** at all levels of management and supervision
- Develop and use **leading and lagging indicators** to measure process safety performance

T2 Laboratories - Jacksonville (US) – 2007

T2 Labs - Jacksonville (US) – 2007 : Why it happened ?



T2 Labs - Jacksonville (US) – 2007 : Lessons to learn vs PSM

- **Process safety information (PSI) :**

  Intrinsically hazardous reaction : full batch mode

  Loss of cooling ➔ Runaway

  No calorimetric and scale-up studies

- **Process Hazard Analysis (PHA) :**

  No HAZOP performed

  No layer of protections :

  - Safety Instrumented systems
  - Redundancy, backup
  - Reactor venting

T2 Labs - Jacksonville (US) – 2007 : Lessons to learn vs PSM

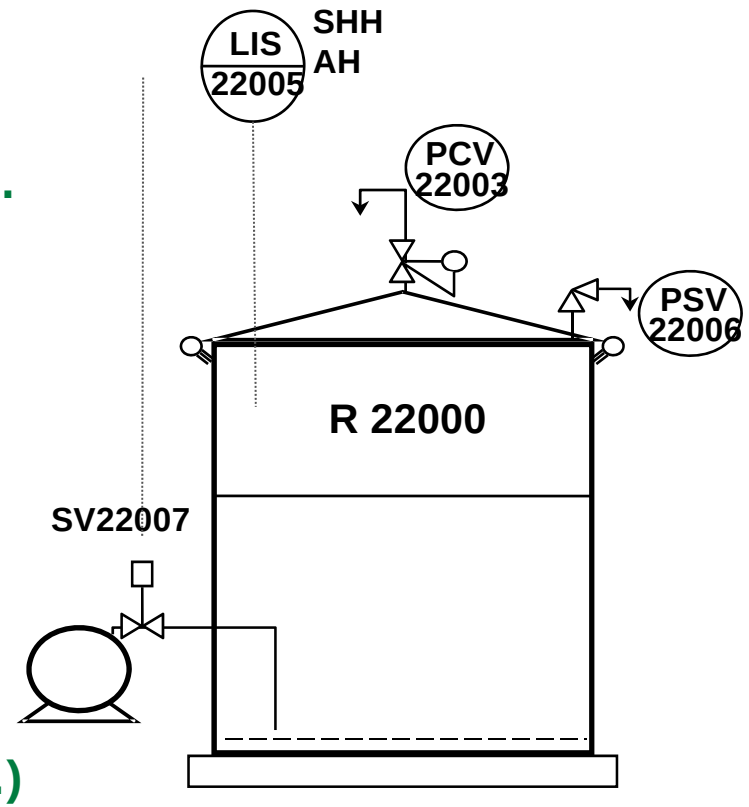
- **Mechanical integrity (MI) :**
  - **Exotic design of cooling & heating system**
  - **Refurbished and re-rated reactor**
  - **Rupture disk not sized & rated too high**
  - **Blockage or cooling valve that failed to operate !**
- **Management of change (MOC) :**
  - **No review of the impact of batch size change**
- **Not to mention :**
  - **Training – Awareness in process safety**
  - **Learning from near misses, …**

3 inch thick

Process Safety Information – Best practice

A **LIVING** documentation on :

- **Hazardous Chemicals**
  - **Not only MSDS but flammability, reactivity data, …**
- **Process Technology**
  - **Updated PIDs**
  - **Human facotr, organization, …**
- **Equipments (Pipes, Vessels & Ancillaries)**
  - **Details on process vessels (design pressure, …)**
  - **Details on PSV, Safety Instrumented Systems**
- **Site**
  - **Site level information is clear and maintained**
  - **Also information outside the fence (population, …)**
- **History**
  - **Safety studies are stored & made available**
  - **Incidents & near misses are recorded &lessons drawn**



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Process Safety Trends – Some examples

- Emergency Relief Systems :
  - Are you really protected ?
  - Are your safety valves & vents designed & sized adequately ?
- SIL studies , Functional Safety – IEC61511
  - Are you safety instrumented systems designed, operated, maintained, tested … ?
  - Are they reliable enough to reduce risk ?
- Consequence modeling & QRA
  - Can you demonstrate your major hazards are acceptable for the society ?
  - Some enforcements under Seveso 3
- Process Safety Management & Culture
  - Are you managing the right way process safety in your company?
  - How process safety is integrated in your organization ?
  - What is the quality of your process safety information ?

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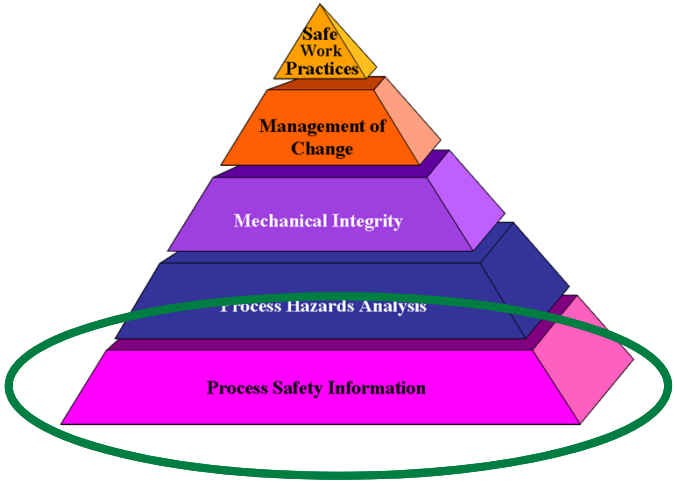
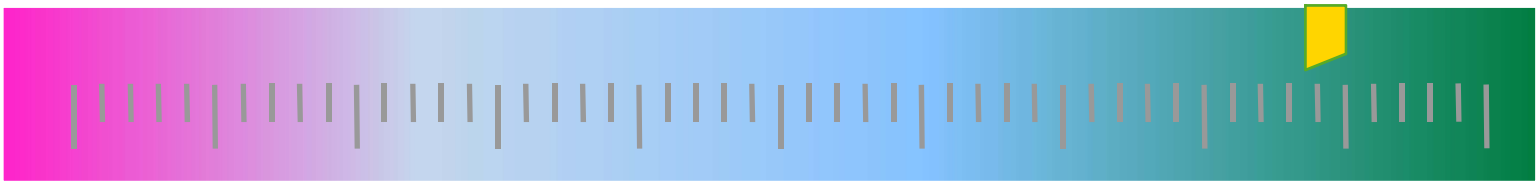
Process Safety Information - Conclusions

- **PSI documentation is vital for all other PSM elements** – Need management & updating
- Understanding of PSI is equally important
- Quality of PSI is a leading indicator of **Process Safety maturity** of a corporation





Infancy

- Still determining coverage issues
- Minimal approach philosophy

Maturing

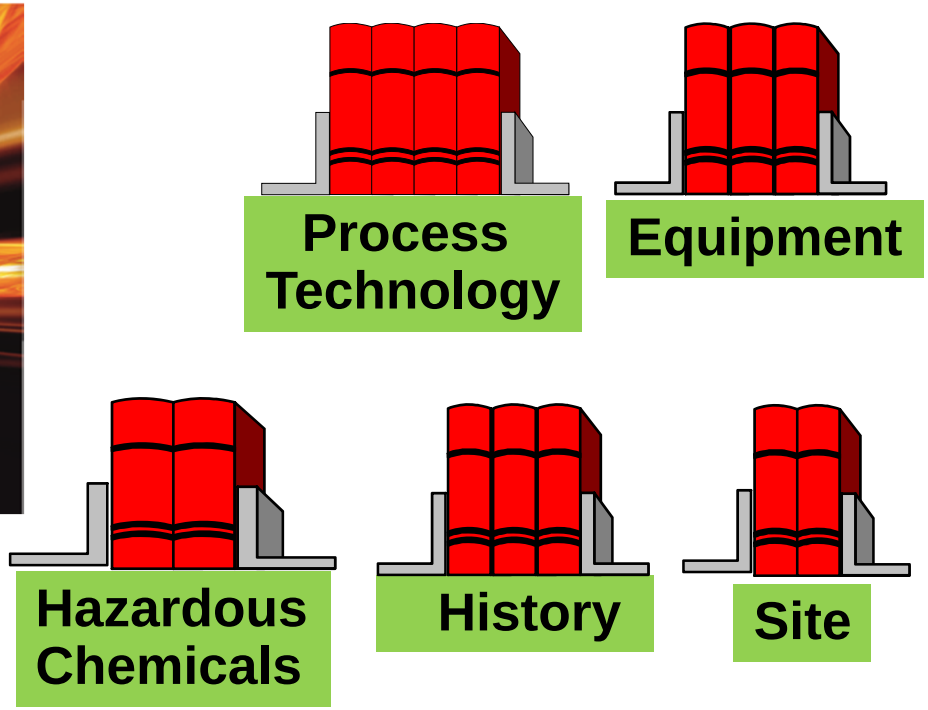
- Focus is compliance
- Still developing /implementing programs

Mature

- Seamless in Business Practices
- Beyond Compliance
- Process Safety as a Value

Questions ?

Thank you!



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