

# Process Safety Management in Downstream



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- Chevron's Downstream & Chemicals Organization
- What is Process Safety?
- Brief history of Process Safety Management (PSM) regulations
- Process Safety Journey
- How You Can Help
- Questions

# Chevron's Downstream & Chemicals Organization and Business Units



- **Americas Products** serves retail, commercial and industrial, and aviation fuel customers in North and Latin America through our world-class Chevron and Texaco brands.
- **International Products** manages commercial and retail merchandizing, marketing, terminaling, pricing, promotion and sales for Caltex and Texaco branded fuels within Asia Pacific, Europe, Africa, Pakistan and the Middle East. It also directs Chevron's joint venture manufacturing activities. These include refineries in Korea, Australia, Thailand, New Zealand, Singapore, Martinique and Pakistan.
- **Lubricants** produces, transports, markets and sells Chevron, Texaco and Caltex lubrication products in the Americas, Asia, Europe, Africa, Pakistan and the Middle East.
- **Oronite** develops and markets quality additives that improve the performance of fuels and lubricants. We manufacture hundreds of additive packages for a wide variety of equipment types. We are the worldwide market leader in a number of areas, including marine, railroad, natural gas engine oils and tractor hydraulic fluids. Components and chemicals are also part of the Oronite product slate.
- **Manufacturing** operates seven wholly-owned refineries, which produce fuels, base oils and other products marketed by Chevron under our three brands – Chevron, Texaco and Caltex.

# What is Process Safety ?



- **Process Safety** is a disciplined framework for managing the integrity of operating systems and processes handling hazardous materials by applying good design principles, engineering, and operating practices.
- **Process Safety** deals with the prevention of incidents that have the potential to release hazardous materials and energy.

Key concept of process safety is the prevention of serious injuries and fatalities and loss of containment incidents (keeping hazards inside of pipes and equipment).

# Examples of Serious Incidents that Led to OSHA's PSM Regulation



- **Mexico City LPG Explosion and Fire 1984**
  - ~ 650 fatalities; large chunks of debris flew over 500 meters (1/3 mile)
- **Bhopal India 1984**
  - ~ 3,800 fatalities, 2,720 permanent disabilities, thousands injured; release of toxic gas
- **Hydrofluoric Acid Release, Texas City 1987**
  - Hospitals treated ~1,000 patients, of which nearly 100 were hospitalized
- **North Sea, Piper Alpha Oil Platform 1988**
  - 167 fatalities, 63 injured
- **Pasadena, Texas 1989**
  - 23 fatalities, 132 injured; registered 3.5 on Richter scale
- **Cincinnati, Ohio 1990**
  - 2 fatalities, 41 injured; chemical plant explosion
- **Sterlington, Louisiana 1991**
  - 8 fatalities, 128 injured; explosion

# OSHA's PSM Regulations



- Following repeated serious incidents, industry groups got together and assembled the foundational concepts of process safety.
- In 1992, the Process Safety Management of Highly Hazardous Chemicals became law with the publishing of 29 CFR 1910.119 – the OSHA PSM Standard.
- PSM Standard applies to:
  - Any processes that handles chemicals at or above the specified threshold quantities (TQ) listed for that chemical in Appendix A of the PSM standard.
  - Any process that involves a flammable liquid or gas on site greater than 10,000 lbs. except
    - ▶ fuels used for workplace consumption or
    - ▶ stored in atmospheric tanks at or below their boiling point

# OSHA's 14 Elements of Process Safety Management



- System Implementation
  - Employee Participation
- Incident Prevention
  - Process Safety Information
  - Process Hazard Analysis
  - Operating Procedures
  - Training
  - Contractors
  - Mechanical Integrity
  - Hot Work Permits
- Incident Management
  - Incident Investigation
  - Emergency Planning and Response
- System Control
  - Management of Change
  - Pre-Startup Safety Review
  - Compliance Audits
  - Trade Secrets

# How does Employee Participation fit into Process Safety Management (PSM)?

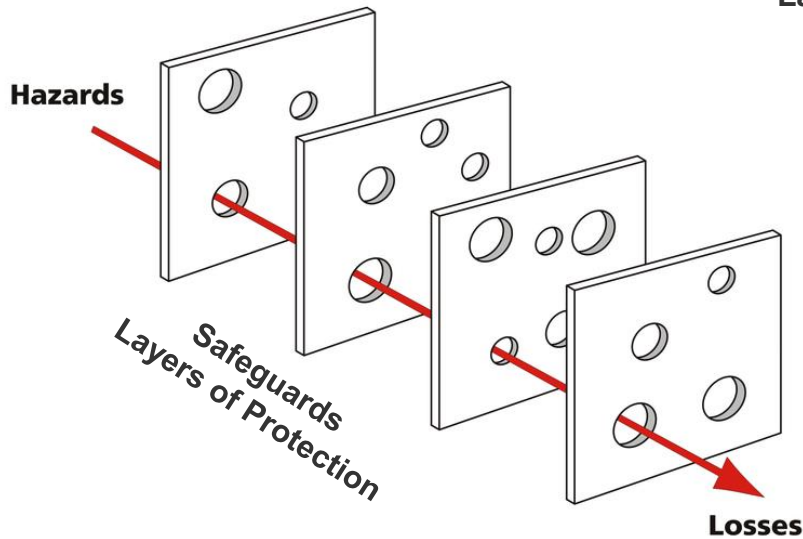
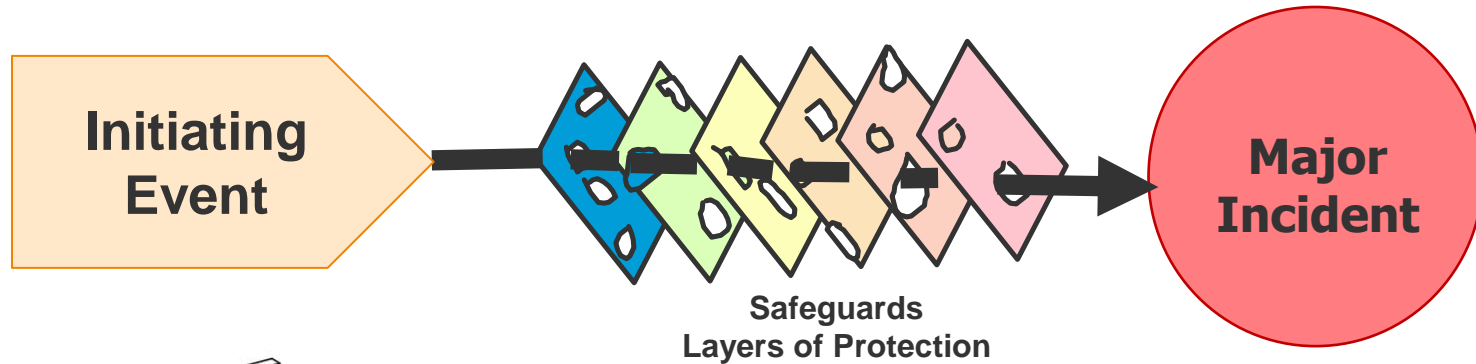


***Employee participation and commitment are critical to maintaining a Process Safety Management system.***



# Process Safety Objectives

## Safeguards / Layers of Protection



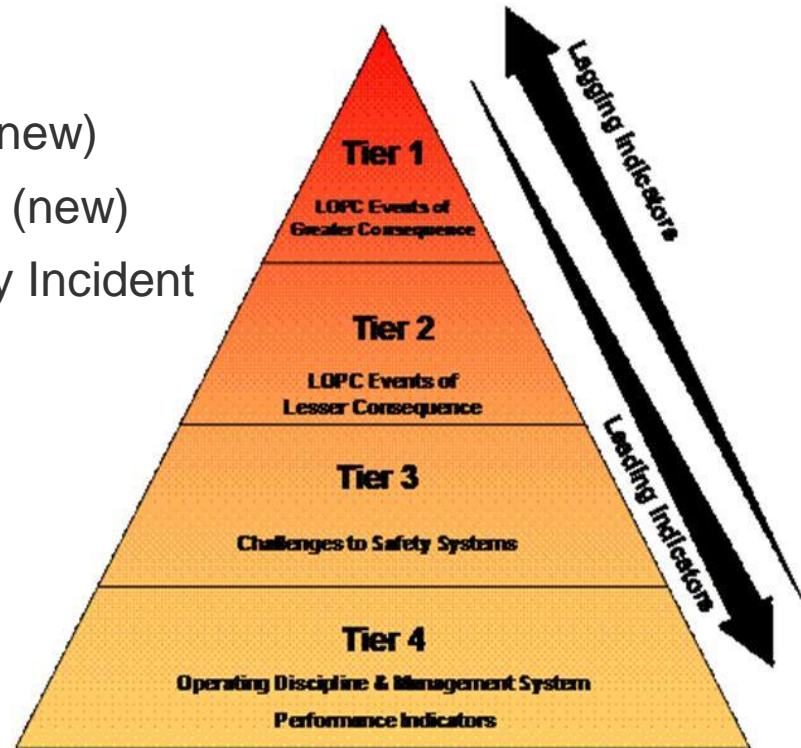
Swiss Cheese Model  
Dr. James Reason, University of Manchester

# Process Safety .. Industry efforts



Examples of industry focus:

- API 583 Corrosion Under Insulation (new)
- API 584 Integrity Operating Windows (new)
- API 585 Pressure Equipment Integrity Incident Investigation (new)
- API 754 Process Safety Metrics
- API 751 HF Alkylation (Rev)
- API 756 Tent Siting
- API 2350 Tank Overfill (Rev)
- Industry incident information sharing



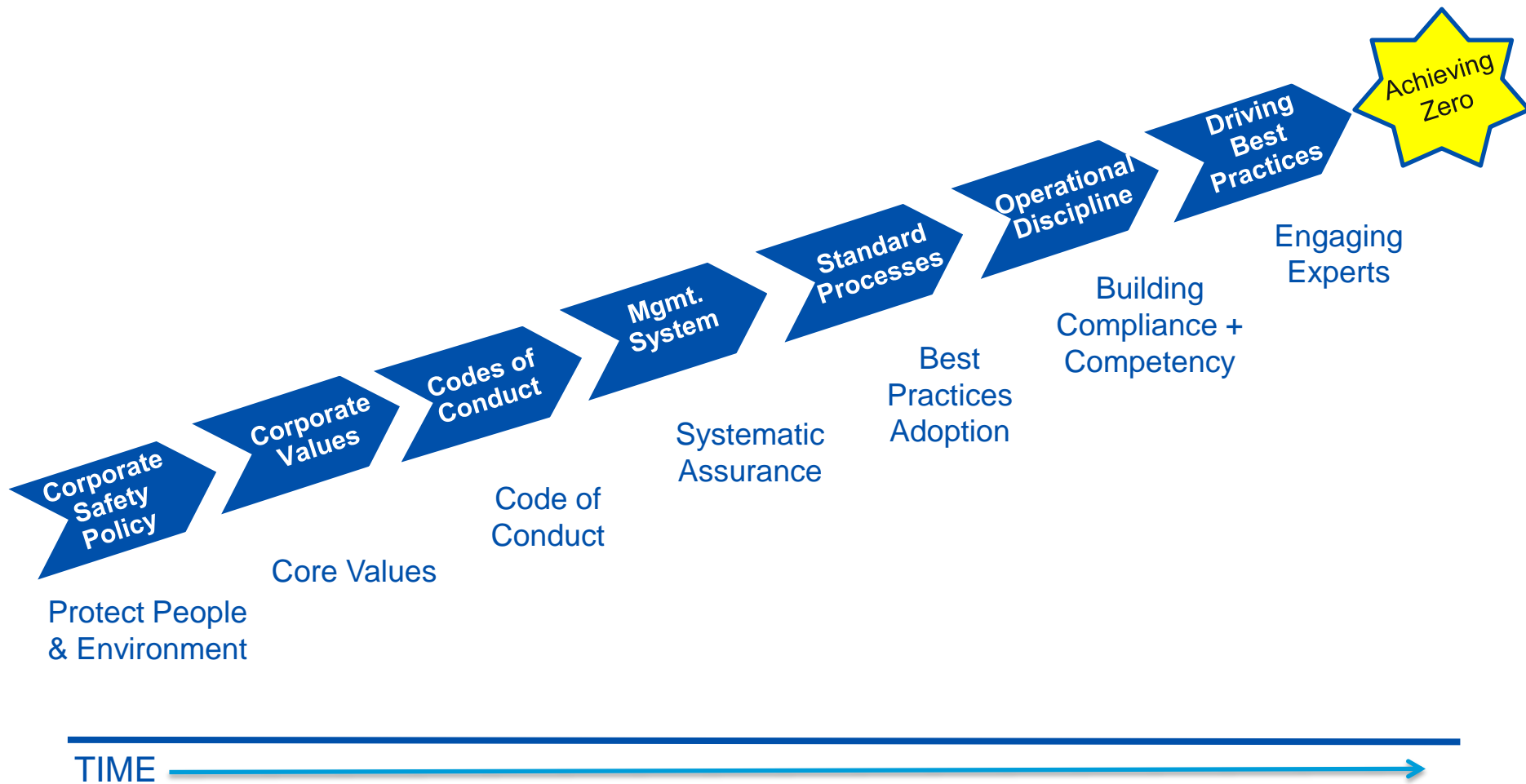
API 754 – Process Safety Performance Indicators

# Process Safety – Why is it important?



- Process Safety events may be high consequence but low frequency. The ‘worst’ may never happen... but, if it does, the consequences may have a significant impact on:
  - ▶ Employees, contractors & their families
  - ▶ Offsite community
  - ▶ Environment
  - ▶ Facility asset & production rates
  - ▶ Company earnings & reputation

# Process Safety Journey



# Process Safety .. How it is practiced?



Leadership Accountability:



Culture



Individual Accountability:

Know the Hazards

Know the Safeguards

Manage the Safeguards



Apply good use of

'Stop Work Authority'



Apply Operational Discipline:

Every task, the right way, every time

# How does Employee Participation fit into Process Safety Management (PSM)?



***Employee participation and commitment are critical to maintaining a Process Safety Management system.***

# How Industry Achieves Process Safety



## What success looks like:

- ✓ No fatalities
- ✓ No fires
- ✓ No serious process safety incidents
- ✓ No environmental incidents that impact the surrounding communities

This is done by building a culture that embraces continual improvement.



# How Can You Help?



In your teachings you can emphasize:

- Engineers play a key role in process safety.
- Engineers need to ensure that the right information is available and evaluations completed to allow the right decisions to be made at the right time.
- Engineers can help shape the culture of any organization, including one that is focused on process safety.
- Engineers can create new processes, tools, and technologies to further improve process safety.
- Everyone must always maintain a sense of vulnerability
- No one should ever become normalized to deviation and complacency
- Beginning your learning journey on process safety while in school ...



# Questions?

