

Managing Major Hazard Process Safety Using Key Performance Indicators (KPIs)

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Synopsis

- The need for KPIs/PSPIs/PSPMs
- Likely Benefits
- KPIs in a 'Process Safety Framework'
- Setting Indicators
- Leading/Lagging Indicators
- 6 Steps to Implementation
- Case Studies etc.
- References

The Need for KPIs

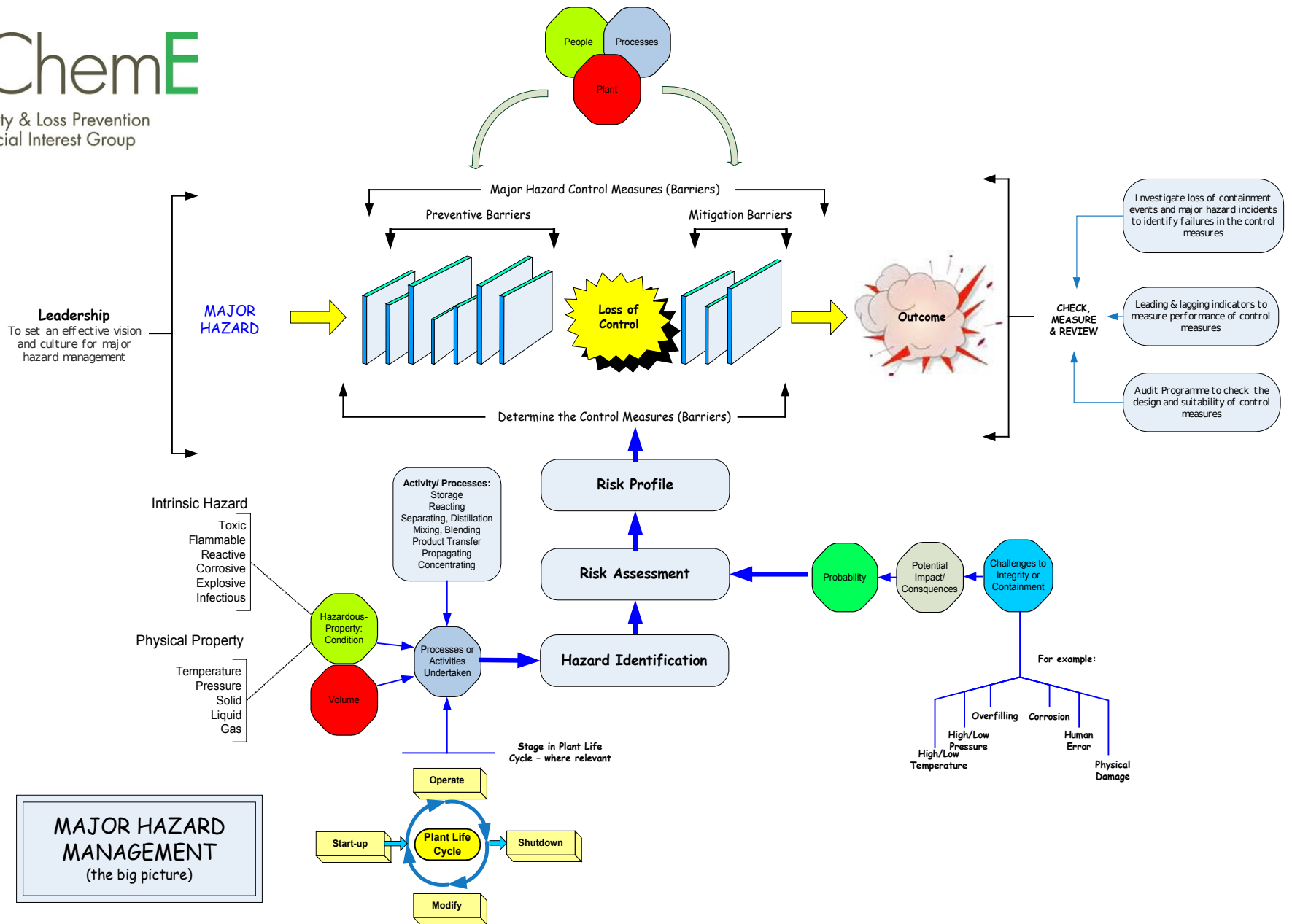
- Reduce the likelihood of Major Accidents
 - High Consequence
 - Low Frequency
- Cannot correlate with lost time accident performance
- Need to monitor the conditions and events that might lead to a Major Accident and act upon poor performance with those

Likely Benefits

- An increased assurance on risk management and protected reputation;
- Demonstrated the suitability of their risk control systems;
- Avoided discovering weaknesses through costly incidents;
- Stopped collecting and reporting performance information which was no longer relevant – thereby saving costs; and
- Made better use of information already collected for other purposes, e.g. quality management.

Process Safety Framework

- What first?
 - Good engineering practice, codes and standards
- What if?
 - HAZID, HAZOP
- What then?
 - Source terms and effects modelling
- Then what?
 - Frequency modelling and vulnerability
- So what?
 - Comparison with criteria
- Do what?
 - Identification of further measures and cost benefit analysis
- What else?
 - Ensuring the process stays safe
 - Audit, review, **KPIs**, learning from accidents/incidents



From: HID Regulatory Model, Safety Management in Major Hazard Industries <<http://intranet/hid/hid-regulatory-model.pdf>>
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Setting Indicators

- Ask Fundamental Questions
 - What can go wrong?
 - What controls are in place to prevent major incidents?
 - What does each control deliver in terms of a **'safety outcome'**?
 - How do we know they continue to operate as intended?
- Should have asked (and answered) most of this already!

Two Types of Indicator

- Leading indicators
 - Require a routine systematic check that key actions or activities are undertaken as intended
 - They can be considered as measures of process or inputs essential to deliver the desired safety outcome.
 - e.g. Number of electrical equipment inspections and tests overdue
- Lagging indicators
 - Show when a desired safety outcome has failed, or has not been achieved
 - e.g. Number of electrical equipment failures in use

1: Establish the organisational arrangements to implement indicators

- Appoint a steward or champion
- Set up an implementation team
- Senior management should be involved

2: Decide on the scope of the indicators

- Select the organisational level
- Identify the scope of the measurement system:
 - Identify incident scenarios - what can go wrong?
 - Identify the immediate causes of hazard scenarios
 - Review performance and non-conformances

3: Identify the risk control systems and decide on the outcomes

- What risk control systems are in place?
- Describe the outcome
- Set a lagging indicator
- Follow up deviations from the outcome

4: Identify critical elements of each risk control system

- What are the most important parts of the risk control system?
- Set leading indicators
- Set tolerances
- Follow up deviations from tolerances

5: Establish data collection and reporting system

- Collect information - ensure information/unit of measurement is available or can be established
- Decide on presentation format

6: Review

- Review performance of process management system
- Review the scope of the indicators
- Review the tolerances

Case Studies etc.

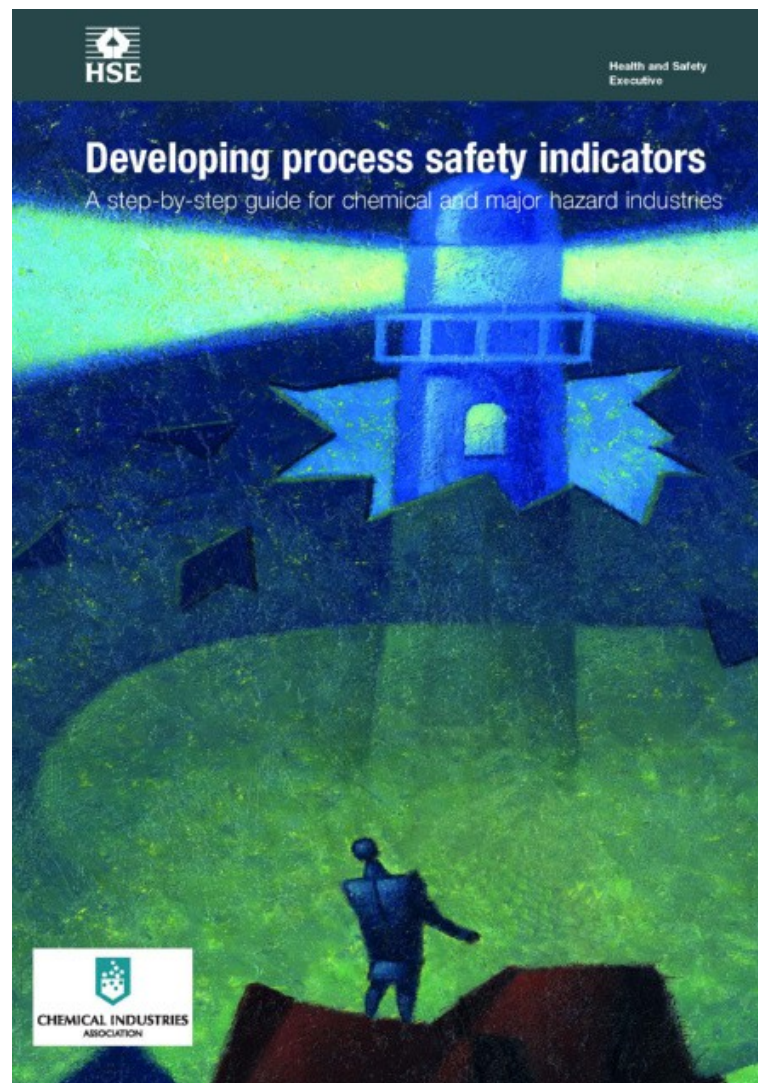
- HSE, HSG 254, part 3 - a top-tier COMAH bulk chemical storage site
- International Association of Oil & Gas Producers (IAOGP),
Process safety, Upstream PSE examples
Report No. 456supp, Nov 2011
- Scottish Power
<<http://www.hse.gov.uk/comah/case-studies/case-study-scottish-power.pdf>>

Main Reference(s)

Health & Safety Executive
(UK)

Developing Process
Safety Indicators

HSG 254



Main Reference(s)

Marsh Energy Practice

Process Safety
Performance Indicators -
PSPIs

Risk Engineering Position
Paper – 04



Other References

- API RP 754 - Process Safety Performance Indicators for the Refining and Petrochemical Industries
- CCPS - Process Safety Leading and Lagging Metrics
- IAOGP - Process Safety, Recommended Practice on Key Performance Indicators
- OECD - Guidance on Developing Safety Performance Indicators (2008), 2 versions
 - Industry
 - Public Authorities / Communities
- Energy Institute - Human factors performance indicators for the energy and related process industries
<<http://www.energyinst.org/technical/human-and-organisational-factors/human-factors-performance-indicators>>
- European Process Safety Centre CEFIC-EPSC Conference
<http://www.epsc.org/content.aspx?Group=products&Page=pspi_conference>