

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

Some Benefits Found

- 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

1. What first?

- Good engineering practice, codes and standards

2. What if?

- HAZID, HAZOP

3. What then?

- Source terms and effects modelling

4. Then what?

- Frequency modelling and vulnerability

5. So what?

- Comparison with criteria

6. Do what?

- Identification of further measures and cost benefit analysis

7. What else?

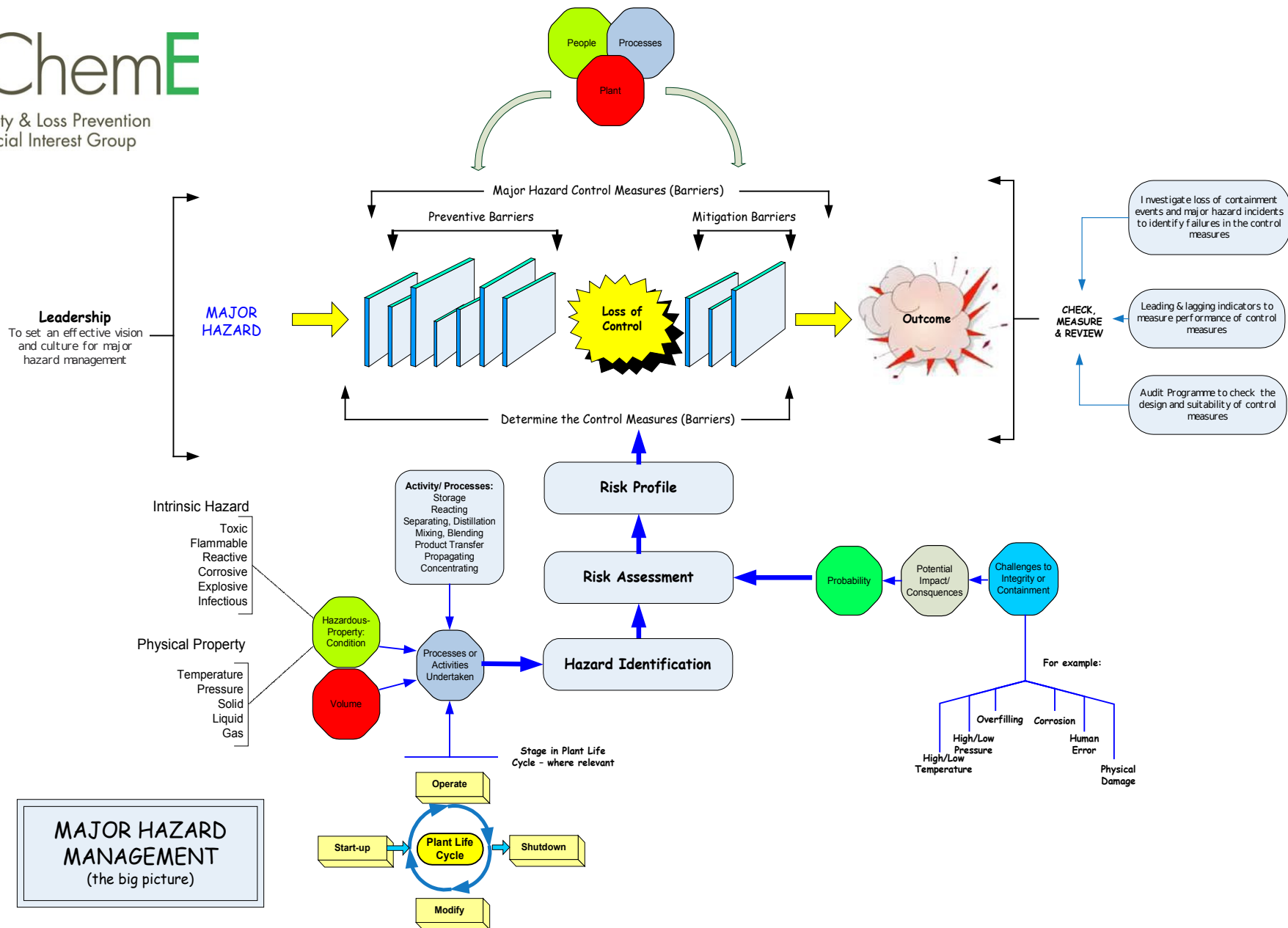
- Ensuring the process stays safe
 - Audit, review, **KPIs**, learning from accidents/incidents

Process Safety Framework

"Identify and apply all relevant good practice precautions whether they be inherent safety, prevention, control or mitigation measures, and whether they relate to hardware, systems of work, or people and their behaviour.

Identify what further measures might be adopted and show that they are not justified (or are justified, as the case may be) on the basis that the monetary value of the safety and other benefits that would accrue are grossly exceeded by the costs of implementing that measure, the depth of the analysis being greater in higher risk situations.

Maintain the system by means of measuring performance, audit and review."



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.

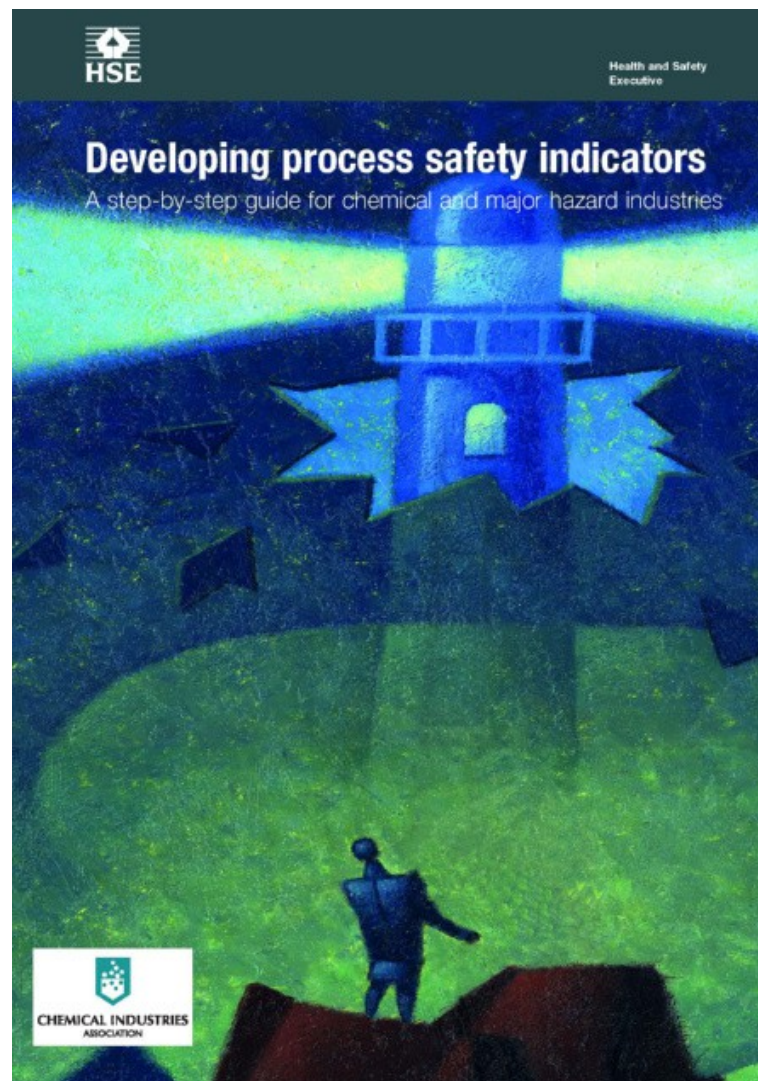
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- International Association of Oil & Gas Producers (IAOGP),
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Report No. 456supp, Nov 2011
- Scottish Power
<<http://www.hse.gov.uk/comah/case-studies/case-study-scottish-power.pdf>>

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>

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