Health and Safety Executive

Process Safety Performance Indicators

Developing PSPIs – the HSG 254 Methodology

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HID CI 3G

Background

- Unacceptable level of process safety related Dangerous Occurrences especially in relation to loss of containment incidents.
- Major Hazard Industry measured safety by using Lost Time Injury Rates
- BP Grangemouth Report highlighted weakness in adopting right measures.

Problem with Monitoring and Measuring

- Critical Systems deteriorate over time without warning until they fail catastrophically.
- Audits tend to be too infrequent & focus on compliance. Workplace inspections focus on personal safety.
- Focus on system design not on delivery of risk control.

The Challenge for Safety Professionals

- What do we want to know & why?
- What use will be made of the information?
- What will change as a result – need to demonstrate a positive impact on safety?
- Focus on directly measuring control of risk.
- Information used by those involved in managing the activity to take immediate corrective action.

HSG 254 System

- What can go wrong?
- Where within the facility will these challenges to integrity be most critical?
- What systems are in place to manage those challenges?
- What does success look like – measure using a lagging indicator.
- What are the critical activities which must work right to deliver the intended outcome – measure continued operation using a leading indicator.

OUTCOMES

- What does the Risk Control System deliver?
  What does success look like?

  WHAT ARE THE DESIRED SAFETY OUTCOMES?

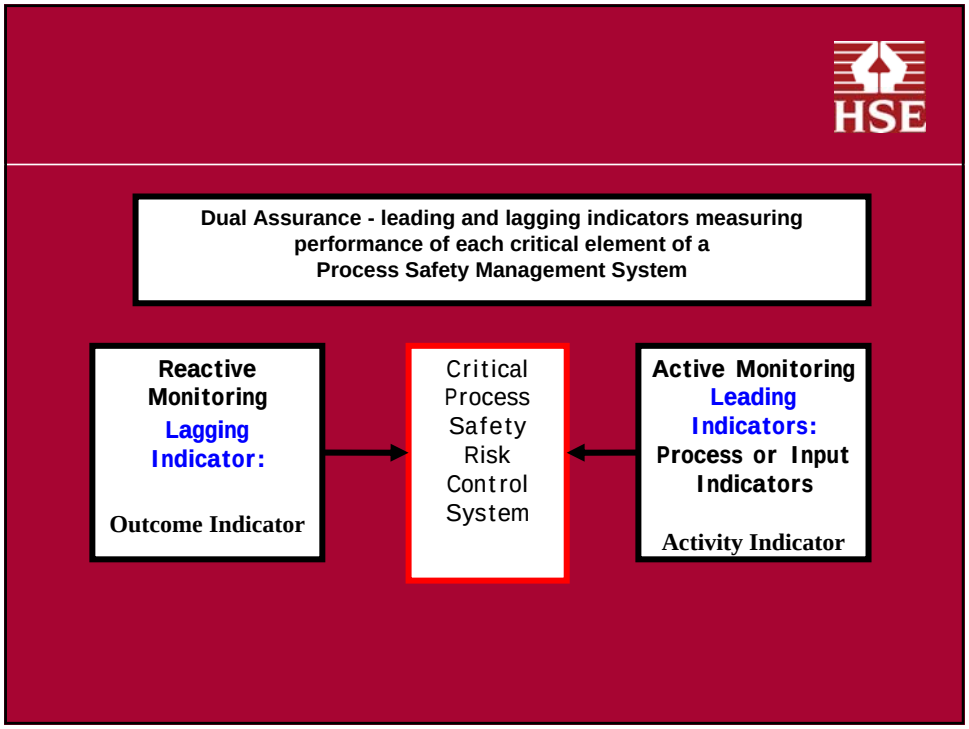
- Measure using a **lagging indicator** to show whether or not the outcome is being achieved

ACTIVITIES

- What are the most important parts of each Risk Control System?

WHAT ARE THE CRITICAL ACTIVITIES THAT MUST BE DONE CORRECTLY EVERYTIME?

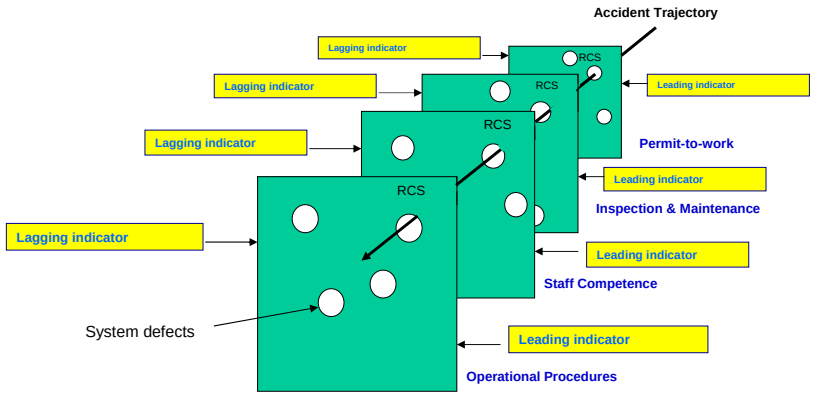
- Measure using a **leading indicator** to show that controls are working as intended

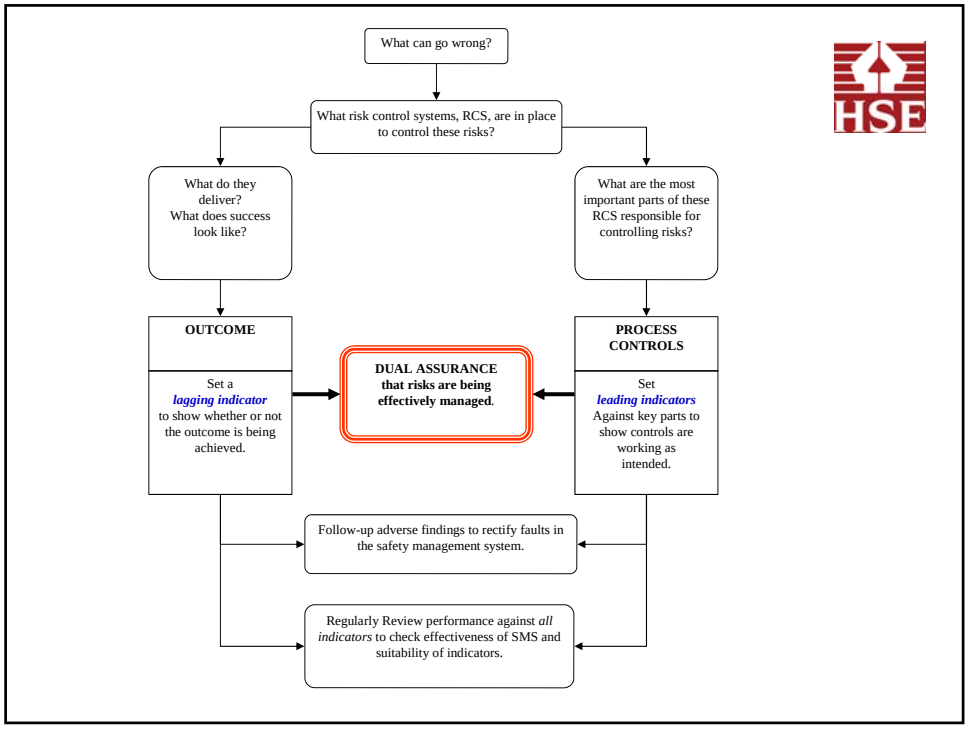


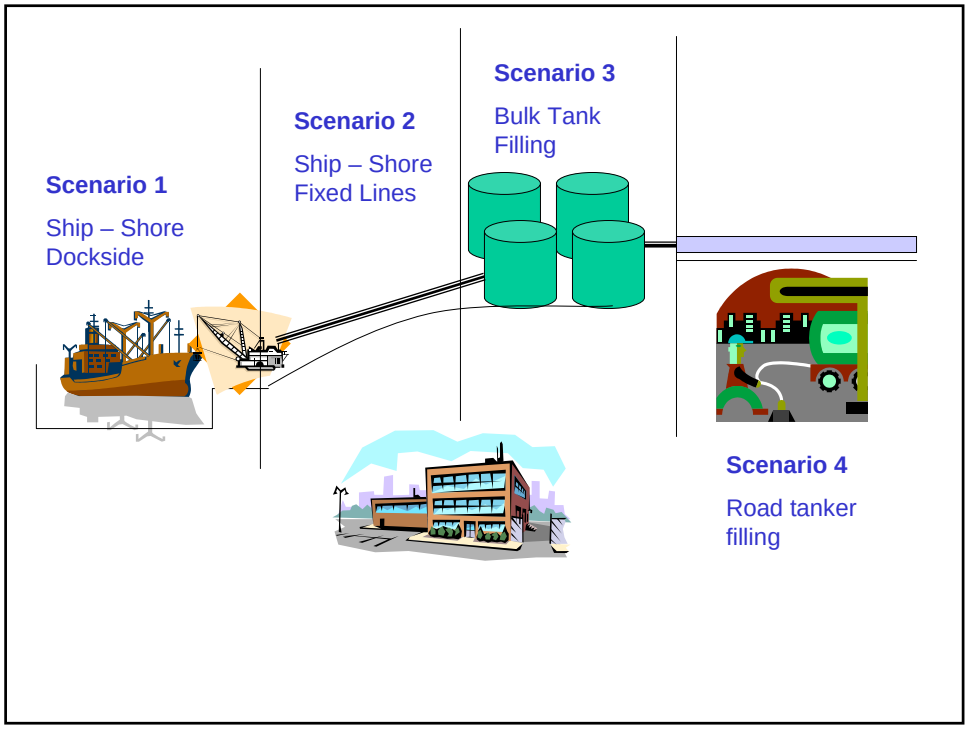
- Set tolerances
- Establish data collection arrangements
- Review
  - Performance of process safety management system
  - Scope of indicators
  - Tolerances

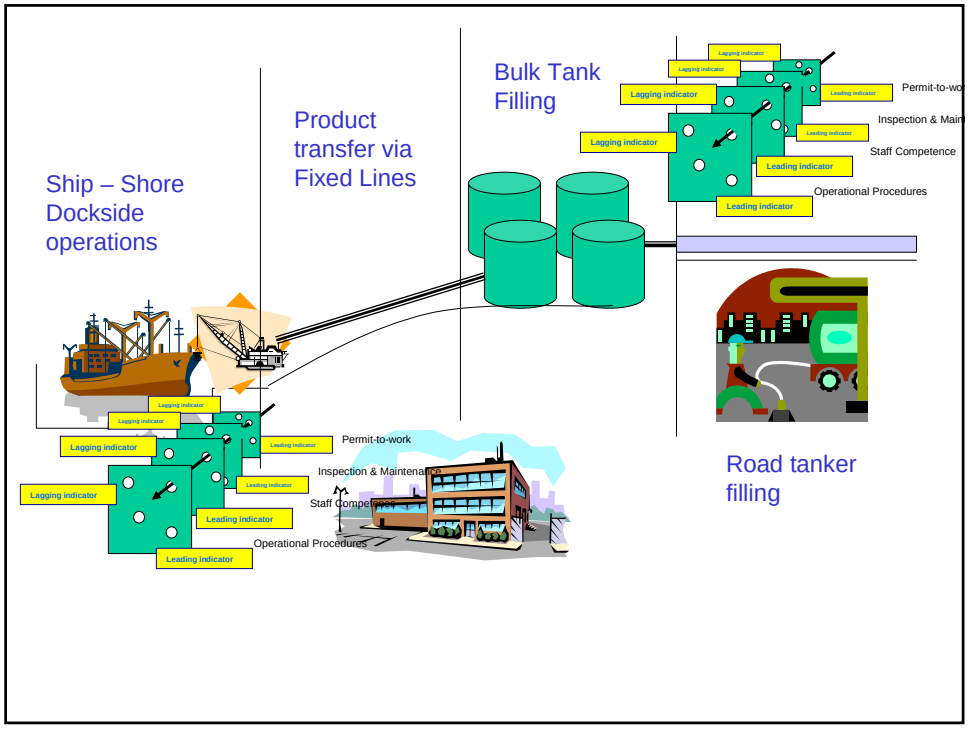
Indicators set to identify defects in risk control systems.

After J. Reason – accident trajectory model




What can go wrong?
What risk control systems, RCS, are in place to control these risks?
What do they deliver? What does success look like?
What are the most important parts of these RCS responsible for controlling risks?
OUTCOME
Set a lagging indicator to show whether or not the outcome is being achieved.
DUAL ASSURANCE that risks are being effectively managed.
PROCESS CONTROLS
Set leading indicators Against key parts to show controls are working as intended.
Follow-up adverse findings to rectify faults in the safety management system.
Regularly Review performance against all indicators to check effectiveness of SMS and suitability of indicators.


Scenario 1
Ship – Shore Dockside
Scenario 2
Ship – Shore Fixed Lines
Scenario 3
Bulk Tank Filling
Scenario 4
Road tanker filling



Advantages of HSG 254

- Directly measures control of risk
- Provides information to those involved to take early corrective action – act on early warning
- Flexible – can be applied in any sector
- Places the onus on the operator to show measuring the right things.

Practical Exercise

Scope of Indicators

- Unit / Plant
- Site / Establishment
- Company / Operator
- Sector / Industry

Why set Process Safety Performance Indicators?

To ensure information on the performance of each element of the process safety management system is available

Process Safety RCS

- Process Controls
- Inspection and Maintenance
- PTW
- Plant Change Management
- Plant Design
- Risk Assessment
- Competence
- Control of Contractors
- Operational Procedures

Operational Controls

Lagging Indicators

- Identify challenges to integrity
- Select the lowest detectable event – (breach of process control envelope) e.g.
  - Overfilling
  - Overpressure
  - Over temp
  - Low flow
  - Excessive corrosion
- Set indicator at the earliest point of deviation

Operational Controls

Leading Indicators

Critical Operator Actions to:

- Set process control / operating envelopes correctly
- Take remedial actions if process deviating from operating envelope
- Routine operation control – monitoring activity

Inspection and maintenance of process control instruments and alarms

Experience to date

- Effort on process safety management is focused on system design rather than the delivery of process safety outcomes
- Most benefit is gained by measuring direct control of risk rather than the completion of programmes of work to deliver risk control

- If possible, both leading and lagging indicators should be developed for each relevant barrier
  - Not always possible, for example emergency response
- Few plant managers know when processes deviate from desired operating parameters

Any Questions?