



**CHEMICAL INDUSTRIES**  
ASSOCIATION



# **PROCESS SAFETY PERFORMANCE INDICATORS**

## **Workbook**



**Use this workbook alongside the Step by Step Guide to decide on indicators for your operation or activities.**

## Description of the Site and Activities

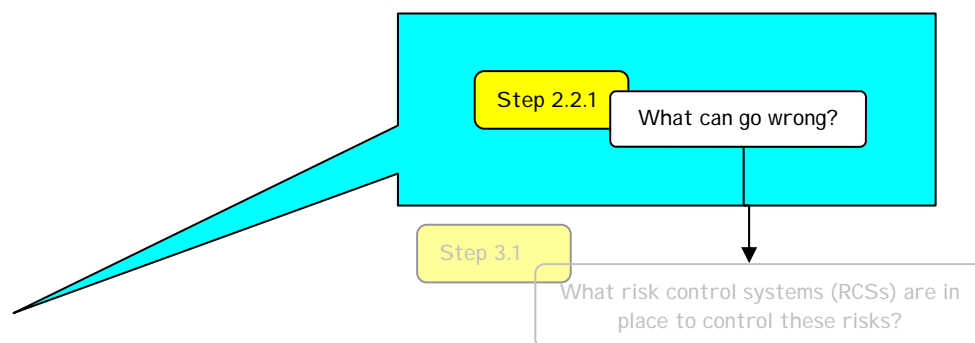
### Overview of Steps 2 - 4

The main stages in selecting Process Safety Indicators are:

- Step 2.2 - Identify the Scope
  - i. Identify the hazard scenarios which can lead to a major incident,
  - ii. Identify the immediate causes of hazard scenarios,
  
- Step 3 – Identify the Risk Control Systems and Describe the Outcome for each – set a lagging indicator
  - i. Identify the risk control systems (RCS) in place to prevent or mitigate the effects of the incidents identified
  - ii. Identify the underlying causes,
  - iii. Identify outcomes of each RCS,
  - iv. Set a lagging indicator for each RCS.
  
- Step 4 – Identify Critical Elements of each RCS and set a Leading Indicator
  - i. Identify the most critical elements of the risk control system and set leading indicators for each element,
  - ii. Set a tolerance for each leading indicator,
  - iii. Select the most relevant indicators for the site or activities under consideration.

#### Step 2.2: Identify the Scope

##### Step 2.2.1: Identify the hazard scenarios which can lead to a major incident



Describing the main incident scenarios helps to maintain a focus on the most important activities and controls against which indicators should be set. The scenarios form a useful cross check later on in Step 4 when the critical elements of risk control systems to be measured are determined.

For this site the main process safety incident scenarios are:

- 
- 

These events may lead to:

- 
-

### Step 2.2.2: Identify the Immediate Causes of Hazard Scenarios

The immediate cause is the final failure mechanism that gives rise to a loss of containment. These usually can be considered as the factors which *challenge* the integrity of plant or equipment.

**Immediate causes:**

### **Step 2.2.3: Identify the Primary Causes**

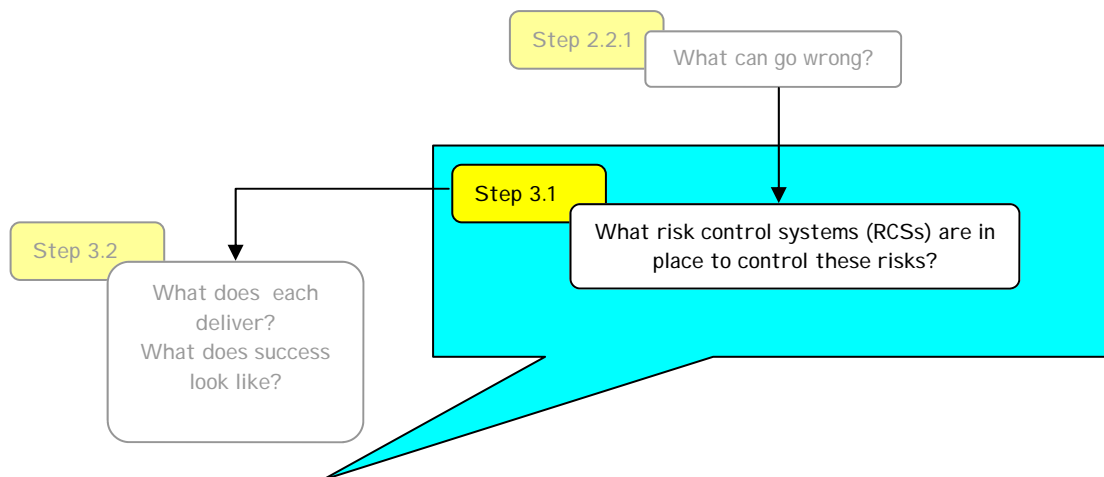
This step is important as it a prerequisite to deciding which risk control systems are important to prevent or control the challenge to integrity.

Primary causes:

- Under pressure
- Lighting strike
- Overpressure
- Corrosion
- Joint flange gasket aging
- Wrong material
- Physical damage
- Subsidence
- Wrong product
- Wear
- Wrong installation
- Vibration
- Overheating
- Static
- Wrong spec
- Quality of material

### **Step 3.1: Identify the associated risk control systems**

Draw up a risk control matrix as illustrated in Table 2, to help decide which RCSs are the most important in controlling the challenges to integrity identified within the incident scenarios.





### Step 3: Identify the Outcome and set a Lagging Indicator

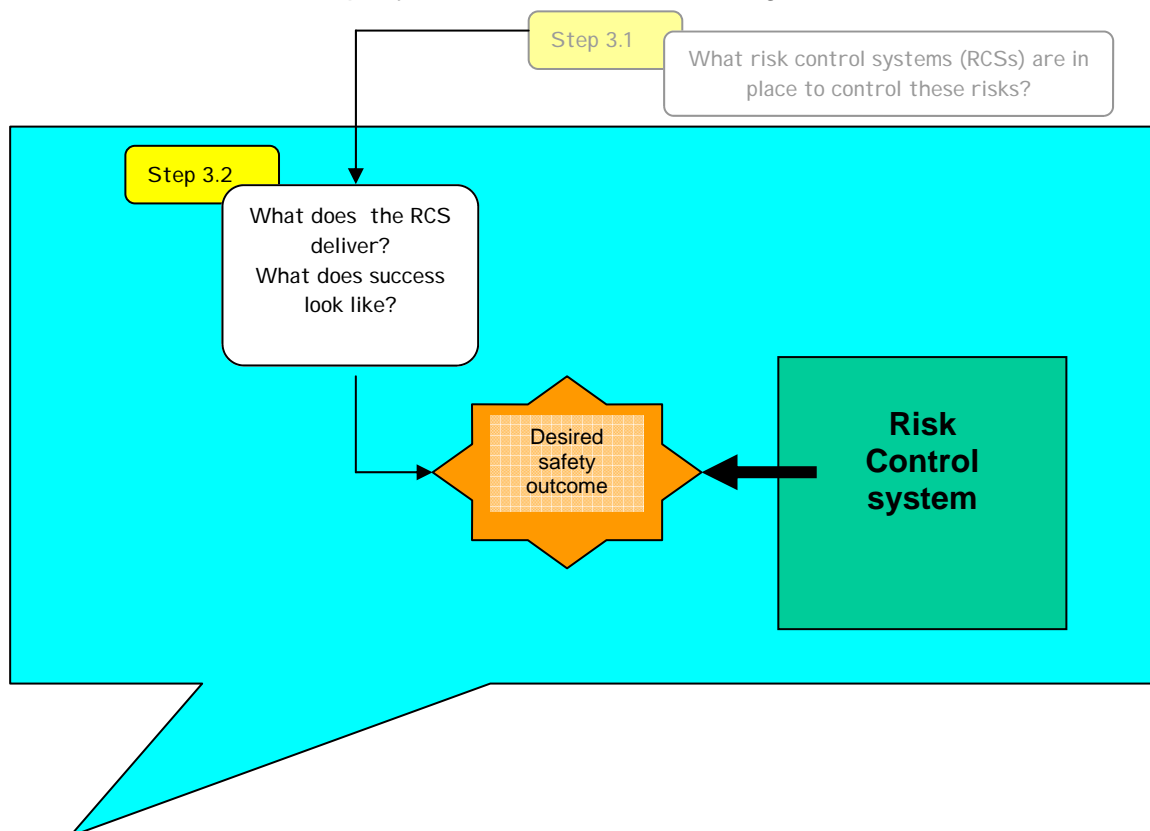
It is vital to discuss and agree the reason why each RCS system is in place is and what it achieves in terms of the scenarios identified. Without this agreement it will be impossible to measure success in delivering this outcome.

It's best to phrase 'success' in terms of a positive outcome - supportive of the safety and business priorities. The indicator can then be set as a positive or negative metric to flag up when this is achieved or when not. As success should be the normal outcome then choosing a negative metric guards against being swamped by data (reporting by exception).

*The following questions may be helpful:*

- Why do we have this risk control system in place?
- What does it deliver in terms of safety?
- What would be the consequence if we didn't have this system in place?

The indicator set should be directly linked to the agreed RCS outcome and should be able to measure a company's success/failure at meeting the outcome.

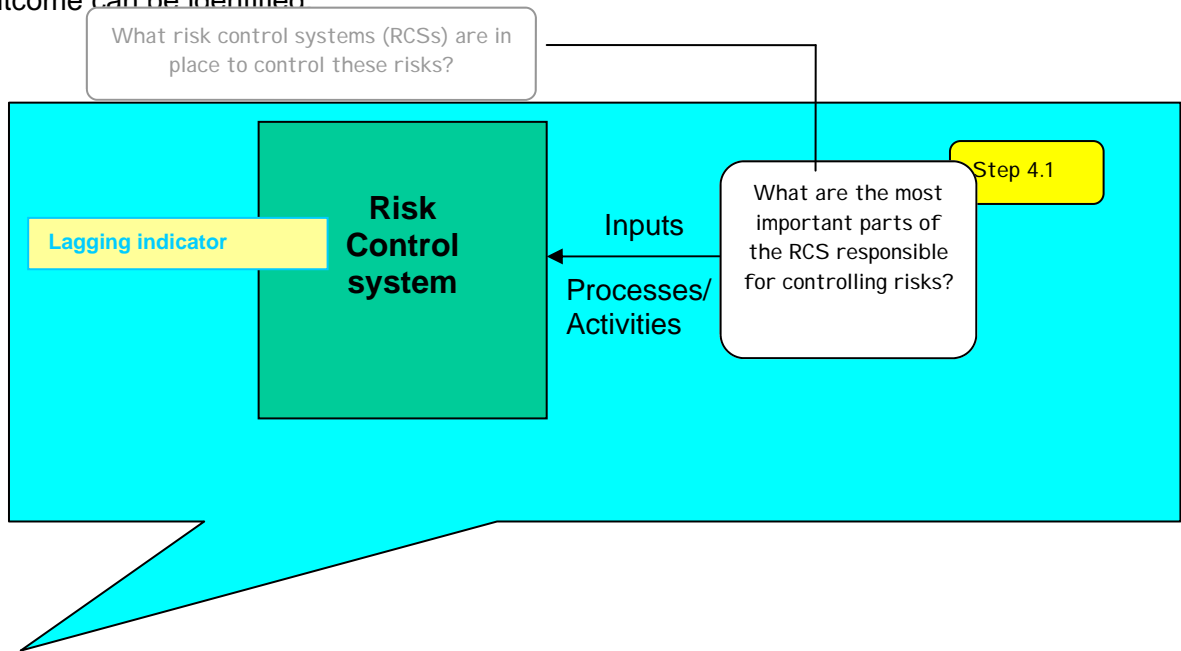


## Step 4 – Identify the Critical Elements of Each Risk Control System and Set Leading Indicators

There are too many elements to a RCS for each to be measured. It is not necessary to monitor every part of a risk control system. Consider the following factors when determining the aspects to cover:

- Which activities or operations must be undertaken correctly on each and every occasion?
- Which aspects of the system are liable to deterioration over time?
- Which activities are undertaken most frequently?

From this the critical elements of each risk control system important in delivering the outcome can be identified



**RCS 1-**

**System Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Leading Indicators:**

**RCS 2 -**

**System Outcomes:**

**Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

**RCS 3 :**

**System Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

**RCS 4:**

**Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

**RCS 5: Tank Subsidence**

**Lagging Indicator**

**Critical elements of RCS**

**Leading Indicators:**

**RCS 6 -**

**System Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

**RCS 7 -**

**System Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

**RCS 8 -**

**System Outcomes:**

**Potential Lagging Indicators:**

**Critical Elements of the RCS**

**Potential Leading Indicators:**

Table 2: SUITE OF PROCESS SAFETY PERFORMANCE INDICATORS

RCS	LAGGING INDICATOR	LEADING INDICATOR
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		