

# Process Safety Cards™



## “A Good Deal Safer”

*“Accidents are not caused by a lack of knowledge, but by a failure to use the knowledge that is available.”*

*Trevor Kletz*

# Basics ...

- Bigger data & better technology are not preventing incidents.
  - ☒ **Are we focusing on wrong Humans & Hardware ?**
- Process Safety initiatives & culture changes come from top down.
  - ☒ **Knowledge not getting to those who need it most (quickly)**
- Gamification & E-Learning are 'fashionable'.
  - ☒ **Can be expensive and exclusive**
- Cards are low-tech, broad-reaching knowledge exchange platform.
  - ☑ **Accessible**
  - ☑ **Memorable**
  - ☑ **Adaptable**

# Improve Awareness & Catalyse Conversations

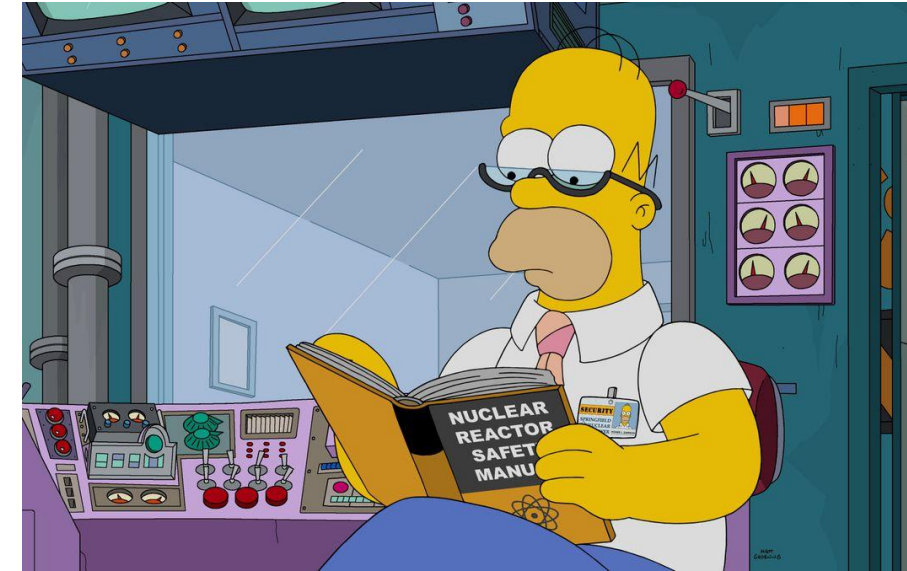
- **KNOW YOUR ENEMY !**

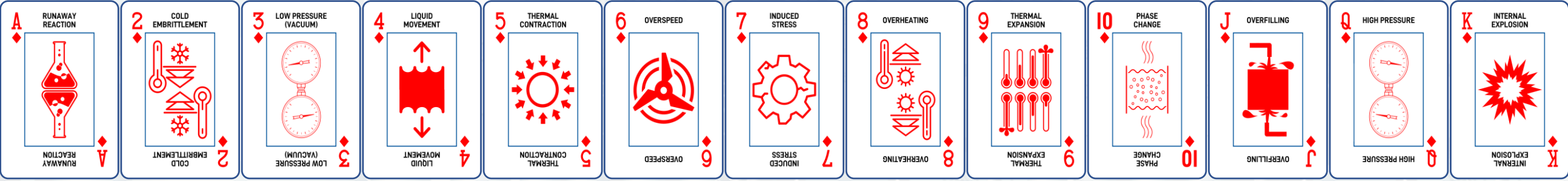
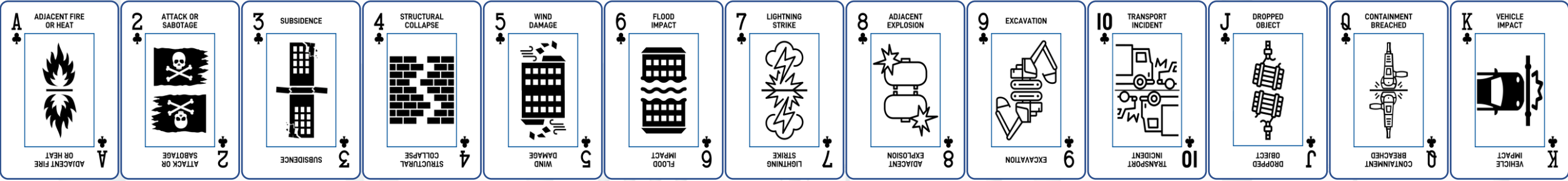
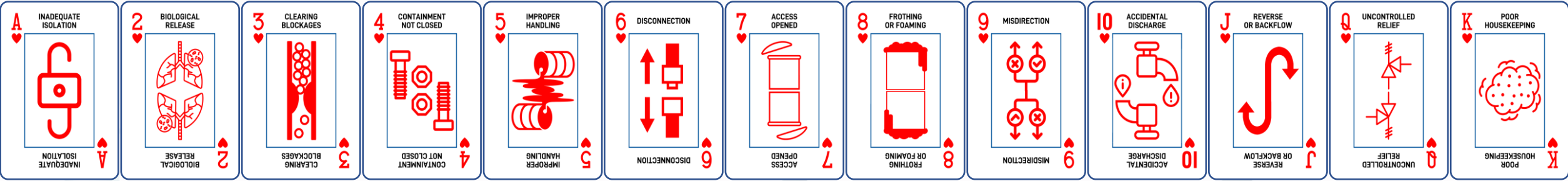
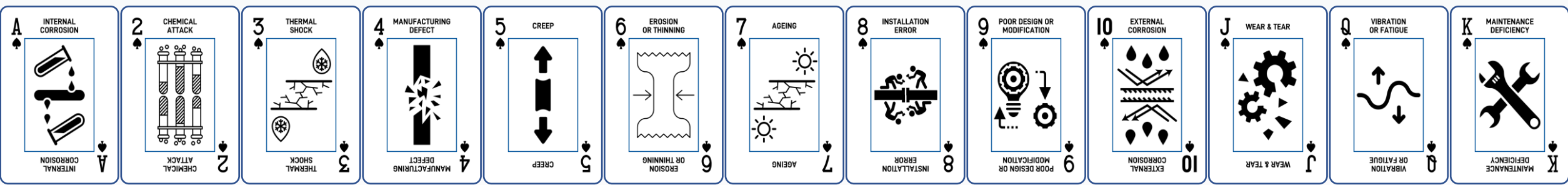
- Loss of Control or Containment



- Simple principles:

- **REMEMBER** Events
- **RECOGNISE** Cause (Threats)
- **RESPECT** Controls (Barriers)
- **REPORT** Concerns
- **RESPOND** (to) Feedback
- **RECOVER** Protection





# Scenarios (Bowties) Enhance Understanding

1. Do you **UNDERSTAND** what can go wrong?
2. Do you **KNOW** what your systems are to prevent this from happening?
3. Do you have information to **ASSURE** you that they are working effectively?



## INTERNAL CORROSION

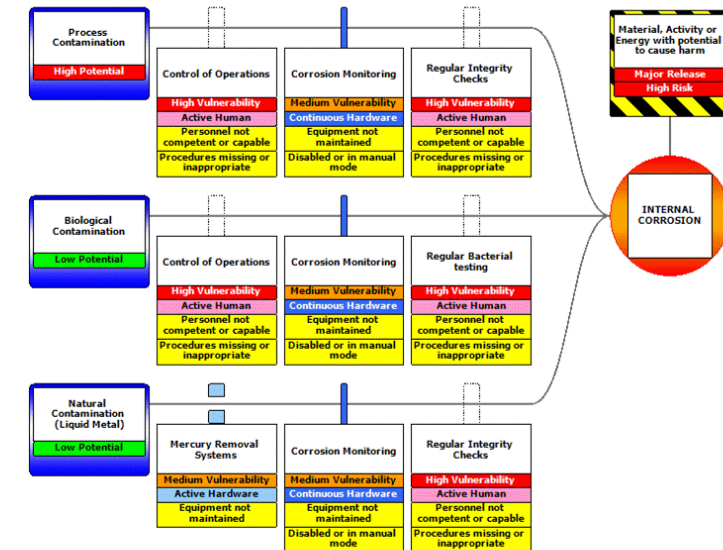


### Typical CAUSES (Threats)

- ◇ Contamination
  - Process e.g. carbon dioxide, water, acids & other chemicals.
  - Microbiologically Influenced Corrosion (MIC)
- ◇ Stress corrosion cracking
  - Chlorides, sulphides, alkali & nitrates
- ◇ Chemical embrittlement
  - Hydrogen assisted/induced or Liquid metal (mercury)

### Typical CONTROLS (Barriers) & VULNERABILITIES (Degradation Factors)

- Separate pages with one LoC Event per sheet & typical:
  - Causes (Threats)
  - Controls (Barriers)
  - Effectiveness/Vulnerabilities (by Type)
  - Degradation Factors
- Physical posting
  - e.g. Control Rooms, Canteens, Workshops or Meeting Rooms
- Online posting
  - e.g. Intranet, SharePoint, Newsletters

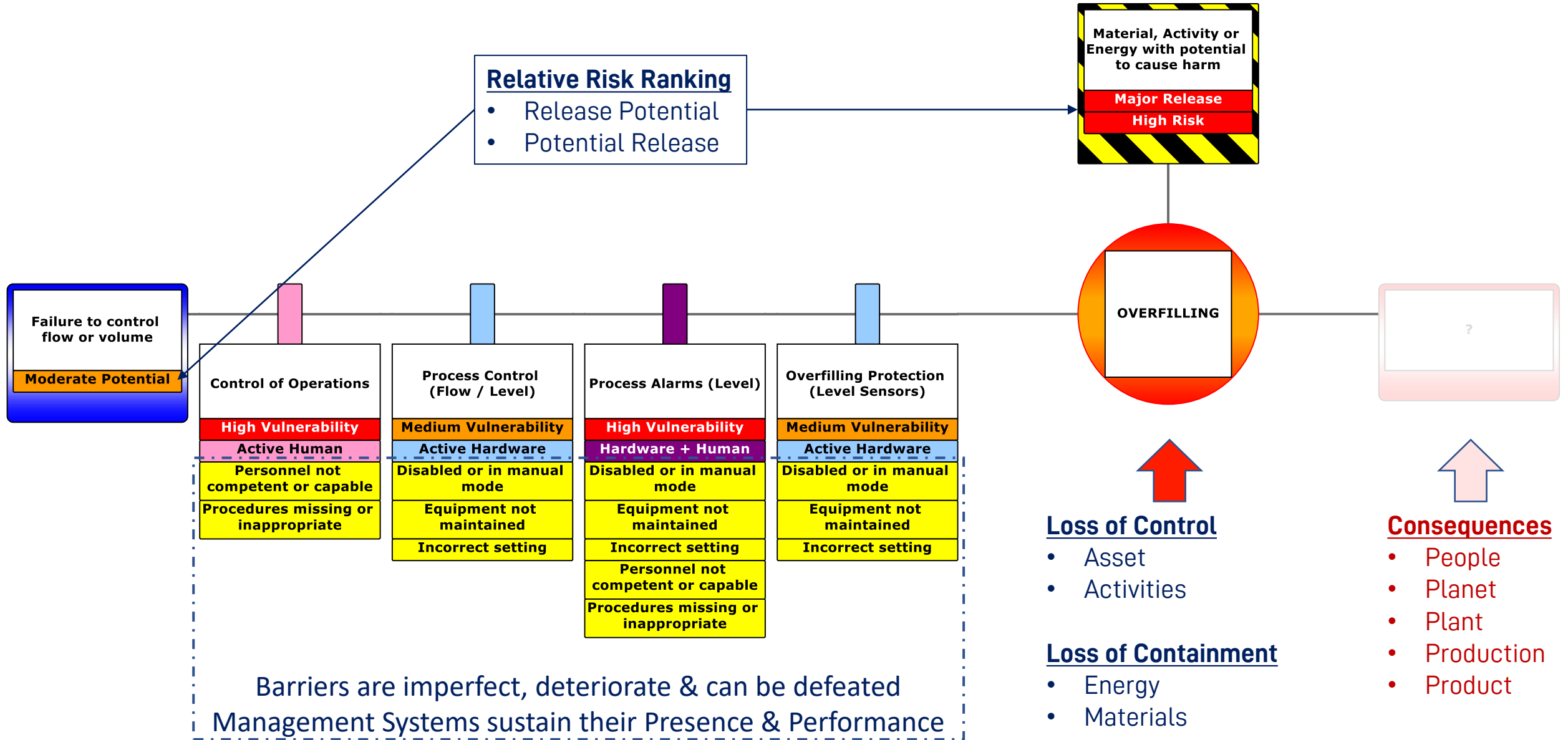


Version 2.1

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# Barrier Focus & Scenario Development



# Operational Opportunities

- Passive learning (osmosis) via informal games.
- Toolbox Talks e.g. explain your experience of the card you've been dealt.
- Quiz e.g. name the event on the card (no title).
- Surveys or Ballots
- Hazard Reminder e.g. attach relevant cards to Work Permits.
- Hazard Spotting/Surveys e.g. cards used to label vulnerable locations during walk round.
- Inductions e.g. Visitors or Outage/Turnaround personnel.



			<p><b>PERMIT TO WORK SYSTEM</b> <b>WORK CLEARANCE FORM</b></p> <p>00000</p> <p>Tick the applicable Life Saving Rules for this activity</p>
<p>Date: .....</p> <p>Person undertaking work: .....</p> <p>Job / Work Order No.: .....</p> <p>Company: .....</p> <p>Site Address: .....</p> <p>Minimum level of PPE to be worn / used at all times. Tick for confirmation</p>			<p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p> <p><input type="checkbox"/> </p>
<p>Work to be done: .....</p> <p><b>HIGH RISK ACTIVITY (PERMIT+ Job Hazard Analysis)</b> <input type="checkbox"/> <b>MEDIUM RISK ACTIVITY (Job Hazard Analysis)</b> <input type="checkbox"/> <b>OTHER</b> <input type="checkbox"/></p> <p>Consult "Appendix 2 - Retail Permit to Work - Activity Table" or your supervisor for more information</p> <p>Permit No.: ..... JHA Reference No.: ..... JHA Review No.: .....</p>			
<p><b>Hazards and Controls</b></p> <p>Tools / equipment to be used (e.g. hand tools, mechanical tools, plant etc): .....</p> <p>Hazards (e.g. moving vehicles, electrocution etc.) and Controls (e.g. guardrails, barricading, locking/tag out, etc). <i>Notes: For Medium or High Risk activity refer to the JHA for further details. The Preliminary JHA must be reviewed for the work that will occur EACH DAY that the permit is open. The Permit</i></p>			
<p>Personal Protective Equipment (PPE) appropriate to the task: .....</p> <p>Fire extinguisher(s) located at: .....</p> <p>Remember to carry out the <b>Last Minute Risk Assessment</b> before and during any task</p>			
<p><b>ACKNOWLEDGEMENT OF WORK - CONTRACTOR</b> The contractor acknowledges that the job will be performed in line with the precautions listed above, that all proposed work has been discussed with the Site Representative, and that the Site Representative will be informed of any incidents. <b>Contractor Site supervisor certify that the work crew have a valid Safety Passport and can perform work at location</b></p> <p>NAME: ..... SIGNATURE: ..... TIME: ..... DATE: .....</p> <p><b>ACKNOWLEDGEMENT OF WORK CREW</b> - The work crew acknowledges that they understand and will comply with the precautions listed above (not required for medium and high risk activities)</p> <p>SIGNATURES</p> <p><b>ACKNOWLEDGEMENT OF WORK - SITE REPRESENTATIVE</b> The Site Representative witnesses the Contractor's signature and agrees to inform the Contractor of any change in site conditions such as tanker delivery or delivery of food goods</p> <p>NAME: ..... SIGNATURE: ..... TIME: ..... DATE: .....</p> <p><b>WORK CLEARANCE CLOSE OUT - CONTRACTOR</b> The contractor acknowledges that the job has been completed / suspended and the site has been left in a safe and satisfactory condition.</p> <p>NAME: ..... SIGNATURE: ..... TIME: ..... DATE: .....</p> <p><b>WORK CLEARANCE CLOSE OUT - SITE REPRESENTATIVE</b> The Site Representative acknowledges that the job has been completed / suspended</p> <p>NAME: ..... SIGNATURE: ..... TIME: ..... DATE: .....</p>			

# Quizzes & Surveys


Forms Process Safety Cards Quiz (EN) - Saved

Preview Theme Share

### Process Safety Cards Quiz (EN)

Sample quiz based around the different decks of Process Safety Playing cards


1



What type of Loss of Containment event does this card represent ? \*

- Overfilling
- Internal corrosion ✓
- Laboratory sampling


2



What type of Ignition Source does this card represent ? \*

- Lightning
- Sharp object
- Static electricity ✓

3



What type of Occupational Safety hazard does this card represent ? \*

39 Responses 03:19 Average time to complete Active Status

Review answers Post scores Open in Excel

1. What type of Loss of Containment event does this card represent ?  
62% of respondents (24 of 39) answered this question correctly.  
[More Details](#)

Overfilling	9
Internal corrosion	24 ✓
Laboratory sampling	6

2. What type of Ignition Source does this card represent ?  
79% of respondents (31 of 39) answered this question correctly.  
[More Details](#)

Lightning	4
Sharp object	4
Static electricity	31 ✓

3. What type of Occupational Safety hazard does this card represent ?  
69% of respondents (27 of 39) answered this question correctly.  
[More Details](#)

Asphyxiating atmosphere	27 ✓
Excessive exercise	6
Localised fog	6

4. Which Process Safety Fundamental does this card represent ?  
67% of respondents (26 of 39) answered this question correctly.  
[More Details](#)

Don't run	7
Practice Emergency Response	26 ✓
Ensure doors remain open for ...	6



# Engineering/Management Opportunities

- Safety Moments e.g. discuss your role related to the card you've been dealt.
- HAZOP/PHA Validation e.g. ensure all deviations (cards) have been discussed.
- Dashboard e.g. incidents categorised by LoC type.
- Relate cards to Company/Industry incidents.
- Hazard Potential e.g. sum values of each card ... A = 11, K/Q/J = 10 & others numbered.
- Campaigns e.g. each week showcase specific event/card/topic.



DEGRADATION		CSB
-	CHEMICAL ATTACK	
-	THERMAL SHOCK	
-	MANUFACTURING DEFECT	
-	CREEP	
-	EROSION or THINNING	
-	AGEING	
-	INSTALLATION ERROR	
-	POOR DESIGN or MODIFICATION	
-	EXTERNAL CORROSION	
-	WEAR & TEAR	
-	VIBRATION & FATIGUE	
-	MAINTENANCE DEFICIENCY	
-	INTERNAL CORROSION	

# Online Tables for Remote/Isolated Interaction

## Process Safety Cards

Remember | Recognise | Respect | Report

www.ProcessSafety.cards

♠ ♥ ♣ ♦

Click & drag cards from each deck and place on the appropriate pile in the column that best describes the current status of the topic or element on the card.

Process Safety Cards © Process Safety Integrity 2021

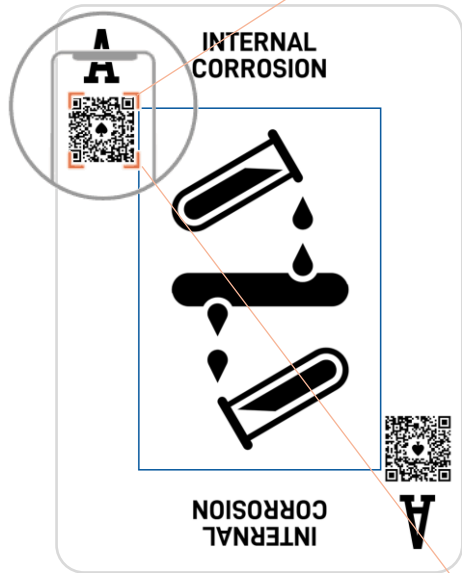
## Process Hazard Analysis

Click & drag cards from the LoC deck to your Hand (bottom of screen - only visible to you). As the analysis progresses, place your card on the appropriate pile in the column when that event has been discussed.

Process Safety Cards © Process Safety Integrity 2021

Click cards to flip. Drag cards to move. Cards placed here are only visible to you.

# Direct Access to Process Safety Intelligence



**Process Safety Cards**  
Remember | Recognise | Respect | Report

Home Events Decks ▾ On

## INTERNAL CORROSION

**CCPS Process Safety Beacon**  
The **Process Safety Beacon** is a resource aimed at delivering process safety messages to plant operators and other manufacturing personnel.

- ✓ Small leak leads to catastrophic failure (Jul 2019)
- ✓ Corroded Tanks (May 2017)
- ✓ Mechanical Integrity (May 2015)
- ✓ Corrosion and Erosion (Jan 2010)
- ✓ Mechanical Integrity (May 2009)

**Causes**

- Contamination
  - Process e.g. carbon dioxide, water, ...
  - Microbiologically influenced corrosion
- Stress Corrosion Cracking
  - Chlorides, sulphides, alkali & nitrate
- Chemical Embrittlement
  - Hydrogen assisted/induced or Liquid

**Incidents**


**Media**

- Emergency Prep...  
Emergency Preparedness: Findings from CSB Accident Investigations
- Animation of Fir...  
Animation of Fire at Chevron's Richmond Refinery, August 6, 2012

**European Process Safety Centre Learning Sheets**  
The **EPSC Learning Sheets** are me... operational sites, to improve comp...

- ✓ Chloride Stress Corrosion (Jul...

**Organisations, Standards & Guidance**

- NACE (NACE International – The Worldwide Corrosion Authority – NACE)
- ASME (The American Society of Mechanical Engineers – ASME)
- HSE (Corrosion / selection of materials (hse.gov.uk))

Edit

Process Safety Cards © Process Safety Integrity 2021

in'telɪdʒ(ə)nəs (Noun) :

1. the ability to acquire and apply knowledge and skills
2. the collection of information of value



# Work Safety Cards



## Process Safety

- Loss of (Primary) Containment



## PSM (Stewardship)

- EI, CCPS & OSHA Frameworks



## Human Factors

- HSE PIF



## Ignition Sources

- EN 1127-1



## Occupational Safety

- ISO 7010



## Chemical Safety

- NFPA & GHS



## Process Safety Fundamentals

- IOGP 638



## Road Transportation

- IOGP 365



## Mining

- Surface & Underground



## Drilling

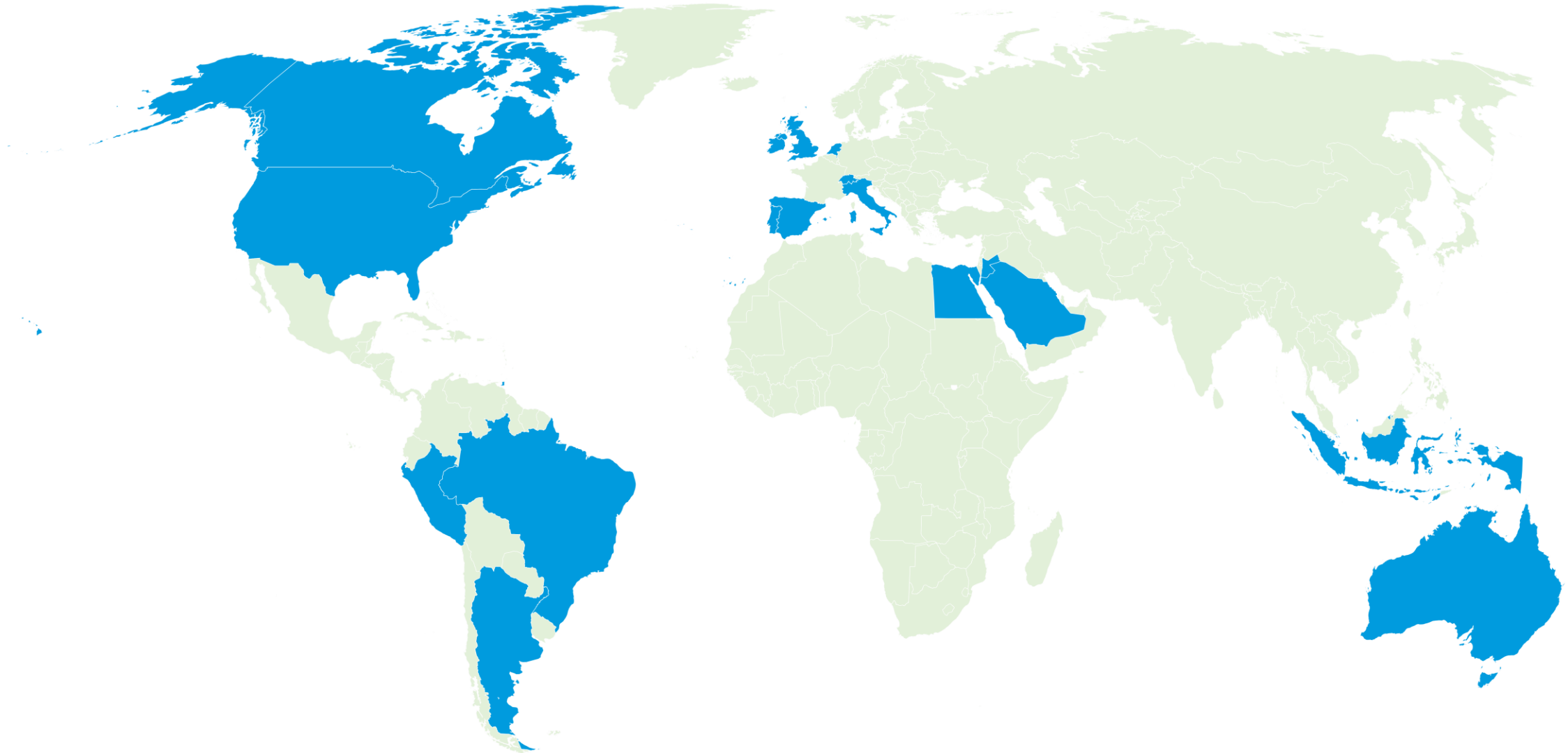
- Offshore & Onshore



## Wind Power

- Offshore & Onshore

# Current Trials



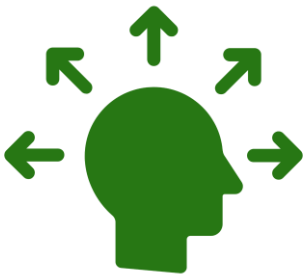
# Conclusions

- **Not a New Game !**

- Knowledge exchange toolkit (Management ↔ Operations).

- **Not a New Strategy !**

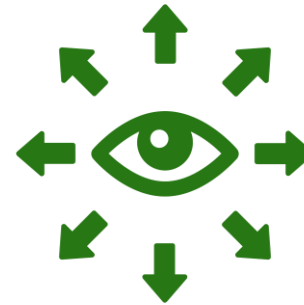
- Help deliver YOUR Process Safety (Asset Integrity) Initiative.



AWARENESS



UNDERSTANDING



VIGILANCE



INTEGRITY

# Thank you - Any questions ?



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