

## Process Safety Fundamentals – going from knowing it, to getting it, to acting on it

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### **Abstract**

Following the successful transition of a Coal Seam Gas operation, GR Production Services (GRPS) identified a strategic opportunity to elevate our safety culture by embedding process safety awareness and capability throughout the organisation. With GRPS' core safety value to get everyone home safely each day and recognising that process safety is critical to preventing catastrophic incidents and protecting our workforce, the environment and surrounding communities, GRPS launched a targeted Process Safety Awareness Campaign.

Success was measured in the uplift of process safety awareness, improved reporting and a more engaged workforce with frontline workers empowered to take ownership of safety and contribute to meaningful safety conversations at all levels. The campaign strengthened safety culture, enhanced process safety capability and proactively reduced process safety incidents. This comprehensive approach resulted in enhancing GRPS process safety capability and reinforced safety as a core value with a proactive, informed and collaborative safety culture across the business.

**Keywords:** Barrier health assurance, frontline voices, HSEQ alerts, operations, process safety fundamentals, process safety libraries, safety, safety awareness, safety culture

## Introduction

Process safety is defined as a disciplined framework for managing the integrity of operating systems and processes that handle hazardous substances. The goal of process safety and asset integrity is to prevent unplanned releases which could result in a major incident. (IOGP 2020)

This paper discusses the effective, strategic approach taken to elevate safety culture by embedding process safety capability throughout the operations and maintenance business. Key initiatives included:

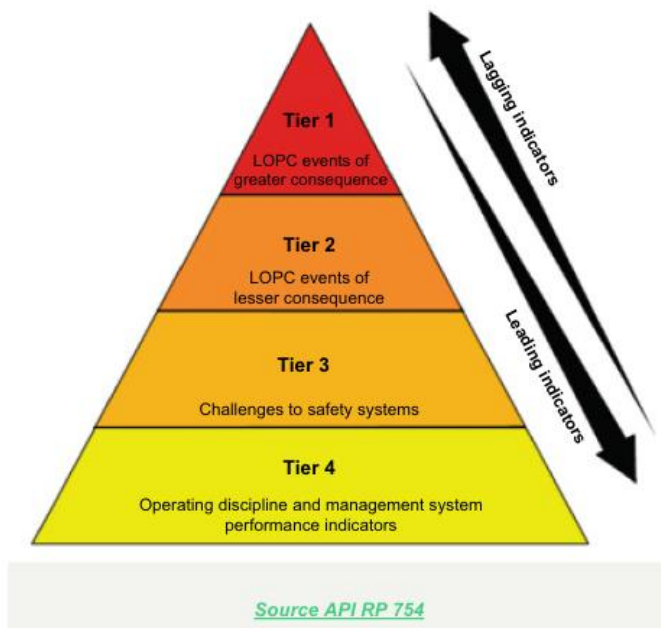
- *Enhanced Reporting*  
Updated and promoted process safety reporting metrics to improve visibility and accountability.
- *Leadership Engagement*  
Introduced rotating process safety shares at Monthly Leadership Meetings to ensure cross-functional ownership and involvement.
- *Creative Campaigns*  
Delivered a 12-month, national multimedia campaign featuring toolbox talks and posters that showcased GR Production Services (GRPS) worker avatars, promoting the 10 IOGP Process Safety Fundamentals (PSFs). (IOGP 2020)
- *Knowledge Hubs*  
Established Process Safety Libraries at office locations and operational sites to support continuous learning.
- *Frontline Voices*  
Engaged frontline supervisors to present process safety events at Corporate Incident Investigation Review Panels.
- *Global Insights*  
Shared relevant international process safety incidents through HSEQ Alerts to broaden awareness and learning.
- *Barrier Health Assurance*  
Identified Safety Critical Elements (SCEs), formally assigned barrier owners, and established recurring Barrier Health Assessment workshops to proactively monitor barrier integrity, verify control effectiveness, and strengthen ongoing process safety assurance.

## Enhanced reporting

A review was undertaken of process safety metrics promoted by IOGP Report 556 (IOGP 2016), Safer Together Process Safety Working Group based on IOGP Report 456 (IOGP 2023) and API RP 754 (Safer Together 2018), and Center for Chemical Process Safety (2022). This resulted in updates to the GRPS Incident Reporting and Investigation Procedure to include:

- Tier 1 and Tier 2 lagging metrics Loss of Primary Containment events (delineated by product released, volume (and/or rate) and event consequence (cost, people, environment, business interruption).
- Tier 3 and Tier 4 leading metrics (challenges to safety systems, operating discipline and management system).

Adopting and promoting these leading and lagging process safety indicators (Fig. 1) resulted in improved reporting and classification of process safety incidents which had previously been reported as Environmental Incidents. Weekly reviews of process safety indicators at the project level also included maintenance compliance for Safety Critical Equipment, Process Safety Vessel Inspections and process safety events.



**Fig.1.** American Petroleum Institute leading and lagging process safety indicators.

## Leadership engagement:

Safety shares are conducted at GRPS Monthly Management Meetings to promote safety across the business. As part of the Process Safety Campaign, it was agreed to rotate monthly safety shares to different members of

the management team with a focus on process safety for the year. This resulted in increased understanding and ownership of the role all departments play in process safety including Human Resources (recruitment, onboarding and training), Contracts and Procurement (procurement of correct equipment to mitigate process safety and Management of Change risks), Finance, Information Technology, Operations, Maintenance and Engineering.

### **Creative campaigns:**

Data reported by IOGP Members (2007-2017) showed that 128 people lost their lives in 56 process safety events. In response to this, the IOGP PSFs were developed to support companies to reduce and eliminate fatal and high severity process safety events.

Designed to support those working in frontline operations, maintenance and wells teams, the IOGP PSFs are informed by data and designed to draw attention to situations that are most likely to lead to process safety event fatalities. (IOGP 2020).

IOGP advise that a key success factor in using PSFs is the manner and tone in which they are presented. With this in mind, GRPS developed and implemented a comprehensive 12-month Process Safety Awareness Campaign with a strong emphasis on increasing awareness through workforce involvement and engagement in promoting the 10 PSFs (IOGP 2020).

Multimedia toolbox talks and resource packs were developed for each of the 10 IOGP PSFs for frontline supervisors to present, engage with their teams and promote related GRPS procedures and tools to support each PSF. The resource packs included PowerPoint presentations including:

- Speaker's notes to support supervisors in delivering a consistent message to the workforce.
- Questions to engage with frontline workers and help make toolbox talks more interactive using relevant local examples.
- Videos of relevant incidents and disasters to show potential consequences of the hazards and risks the PSFs mitigate or control – reinforcing 'the why'.
- HSEQ notice board posters featuring avatars of frontline workers and leaders (Fig. 2) to promote GRPS process safety champions and give a human face connecting each PSF.











<h3>What are Process Safety Fundamentals (PSF)?</h3> <ul style="list-style-type: none"> <li>It's what you can do to 'keep gas in the pipes'</li> <li>10 actions to reduce and ultimately eliminate fatal and catastrophic events</li> <li>They are different from Life Saving Rules</li> <li>PSFs are the responsibility of everyone</li> </ul> 	<h3>What can we do to 'Respect Hazards?'</h3> <ul style="list-style-type: none"> <li>We <b>improve</b> our understanding of process safety hazards at our location and our roles in controlling them.</li> <li>We are <b>vigilant</b> about the potential impacts of uncontrolled process safety hazards.</li> <li>We <b>discuss</b> process safety hazards before starting a task.</li> <li>We <b>bring forward</b> process safety hazards to be included in activity risk assessments.</li> </ul> 	<h3>How do we 'apply procedures?'</h3> <ul style="list-style-type: none"> <li>We use operating and maintenance procedures, even if we are familiar with the task.</li> <li>We discuss the key steps within a critical procedure before starting it.</li> <li>We pause before key steps and check readiness to progress.</li> <li>We stop, inform supervision and avoid workarounds if procedures are missing, unclear, unsafe, or cannot be followed.</li> <li>We take time to become familiar with, and practice, emergency procedures.</li> </ul>  <p>Josh Harrison, WA &amp; NT</p>
<h3>How do we 'sustain barriers?'</h3> <ul style="list-style-type: none"> <li>We <b>discuss</b> the purpose of hardware and human barriers at our location.</li> <li>We <b>evaluate</b> how our tasks could impact process safety barriers.</li> <li>We <b>speak up</b> when barriers don't feel adequate.</li> <li>We <b>perform</b> our roles in maintaining barrier health and alert supervision to our concerns.</li> <li>We <b>perform</b> an approval process for operations with degraded barriers.</li> </ul>  <p>Sara Ivanic, Gladstone</p>	<h3>How do we 'stay within operating limits?'</h3> <ul style="list-style-type: none"> <li>We <b>discuss and use</b> the approved operating limits for our location.</li> <li>We <b>escalate</b> where we cannot work within operating limits.</li> <li>We <b>alert</b> supervision if an alarm response action is unclear or the time to respond is inadequate.</li> <li>We <b>obtain formal approval</b> before changing operating limits.</li> <li>We <b>confirm</b> that potential for overpressure from temporary pressure sources has been addressed.</li> </ul>  <p>Clive Robinson, Moranah Gas Project</p>	<h3>How do we 'maintain safe isolation?'</h3> <ul style="list-style-type: none"> <li>We <b>use</b> isolation plans for the specific task, based on up-to-date information.</li> <li>We <b>raise</b> isolation concerns before the task starts and challenge when isolation plans cannot be executed.</li> <li>We <b>check</b> for residual pressure or process material before breaking containment.</li> <li>We <b>monitor</b> the integrity of isolations regularly and stop to reassess when change could affect an isolation integrity.</li> <li>We <b>confirm</b> leak-tightness before, during and after reinstating equipment.</li> </ul>  <p>Tristan Paxon, Santos Cooper Basin</p>
<h3>How do we 'walk the line?'</h3> <ul style="list-style-type: none"> <li>We <b>use</b> up-to-date documentation (e.g. P&amp;IDs) that accurately reflect installed systems and equipment.</li> <li>We physically <b>confirm</b> the system is ready for the intended activity (e.g. valve positions, line up of relief devices, etc.).</li> <li>We <b>alert</b> supervision to identified documentation and readiness issues before operation.</li> </ul>  <p>Chris Goodfield, EN - NT</p>	<h3>How do we 'control ignition sources?'</h3> <ul style="list-style-type: none"> <li>We <b>identify, eliminate or control</b> the full range of potential ignition sources during task risk assessments and during job preparation and execution.</li> <li>We <b>minimise</b> and challenge ignition sources even in "non-hazardous" areas.</li> <li>We <b>eliminate</b> ignition sources during breaking containment and start-up and shutdown operations.</li> </ul>  <p>Chris Gieger, Gladstone</p>	<h3>How do we 'recognise change?'</h3> <ul style="list-style-type: none"> <li>We <b>look for and speak up</b> about change.</li> <li>We <b>discuss changes and involve</b> others to identify the need for management of change (MOC).</li> <li>We <b>review</b> the MOC process for guidance on what triggers an MOC.</li> <li>We <b>discuss and seek</b> advice on change that occurs gradually over time.</li> </ul>  <p>Ihsan Karamuzzaman Hess, Moranah</p>
<h3>We stop if the unexpected occurs</h3> <ul style="list-style-type: none"> <li>We <b>discuss</b> the work plan and what signals would tell us it is proceeding as expected.</li> <li>We <b>pause</b> and ask questions when signals and conditions are not as expected.</li> <li>We <b>stop and alert</b> supervision if the activity is not proceeding as expected.</li> </ul>  <p>Cameron Wells, CEO</p>	<h3>We watch for weak signals</h3> <ul style="list-style-type: none"> <li>We proactively <b>look</b> for indicators or signals that suggest future problems.</li> <li>We <b>speak up</b> about potential issues even if we are not sure they are important.</li> <li>We persistently <b>explore</b> the causes of changing indicators or unusual situations.</li> </ul>  <p>Greg Christfield, HSE Q Manager</p>	

Fig.2. GRPS Employee avatars used to promote Process Safety Fundamentals.

### Knowledge hubs:

Unfortunately, the history of process industries shows that many incidents are repeated after a lapse of a few years. People move on, and the lessons are forgotten (Kletz 2003). Process safety libraries with key books (Fig. 3) were established in office and operational sites for workers to read and share relevant case studies to reinforce the hazards and risks PSFs are designed to prevent.

The importance of learning lessons from past incidents is further reinforced by J Morford in the foreword of Incidents That Define Process Safety, where he wrote: Walking on the grounds of the trailer park near the Isomerisation unit in Texas City where fifteen of our colleagues lost their lives and hundreds were injured was the most difficult experience of my career. Two years later, I strongly believe that an essential element to raise Process Safety awareness in our industry is to make sure that lessons from such past incidents are widely shared and known by all. (Atheron and Gill 2008)

As stated by Trevor Kletz: A high price was paid for the information in this book: people were killed or injured and billions of dollars' worth of equipment was damaged. Someone has paid the 'tuition fees'. There is no need for you to pay for them again. (Kletz 2003).

A key tool in raising workforce awareness to high consequence, low frequency process safety events is sharing global disasters involving similar risks and hazards that GRPS workers are exposed to on a daily basis. Establishing process safety libraries at office locations and operational sites to support continuous learning proved valuable in reinforcing why PSFs were developed and confirming implementation and effectiveness of PSFs across GRPS operations.



Fig. 3. GRPS Project site process safety library.

### Frontline voices:

GRPS conducts quarterly Incident Review Panels to review potentially significant incident investigations across the business to verify investigation findings and actions, and confirm strategies are in place to share learnings and mitigate risk across the business. Inviting front line supervisors to present findings from process safety

incidents to the Senior Leadership team reinforces the importance of sharing lessons learned across the business and allows the leadership to engage and support frontline supervisors in PSF implementation and effectiveness.

### **Global insights:**

Process safety alerts and bulletins from external organisations including the CCPS Process Safety Beacon, European Process Safety Centre, Safer Together and Australian Regulators are shared to facilitate discussions that influence and reinforce behaviours focused on helping prevent harm to frontline workers.

The Process Safety Beacon is a resource aimed at delivering process safety messages to plant operators and other manufacturing personnel. The monthly one-page newsletter covers the breadth of process safety topics. Each issue presents a real-life accident and describes the lessons learned and practical means to prevent a similar accident in your plant. (CCPS)

Safer Together learning event bulletins focus on ‘unwanted events/threats’ as triggers to investigate and disseminate lessons learned and encourage industry to approach unwanted events/threats with a positive learning mindset ([Safer Together 2018](#)).

### **Barrier health assurance**

A structured Barrier Health Assurance initiative was implemented to strengthen oversight of Safety Critical Equipment (SCE) across the facilities. Identified SCE were reviewed, with associated bowties updated to reflect current operating conditions and credible threat scenarios. Formal barrier owners were assigned to ensure accountability for monitoring performance standards and control effectiveness. A comprehensive 2-day workshop was conducted with cross-functional participation to assess barrier integrity, verify safeguards, and identify improvement opportunities. Outcomes from the workshop were documented with key risks and follow-up actions captured in the corporate risk register to ensure visibility and governance. This assessment process is embedded as a recurring activity, providing continuous assurance of barrier health to sustain proactive process safety management.

### **Summary and conclusion**

This comprehensive approach resulted in strengthening GRPS’ process safety capability and reinforced safety as a core value with a proactive, informed and collaborative safety culture across the business.

Implementing the GRPS 12-month Process Safety Awareness Campaign has greatly assisted GRPS in building a solid foundation to achieve a culture of process safety awareness through every facet of our work and enable the business to design, build and operate in a way that reduces or mitigates potential catastrophic risk. Whilst GRPS’ PSFs journey from knowing it, to getting it and acting on it has been successful to date, with a growing

workforce and an understanding that we cannot be complacent with safety education, we remain committed to continuously reinforcing the PSF messages.

## References

- Atherton J, Gil F (2008) 'Incidents that define process safety'. (Center for Chemical Process Safety)  
Center for Chemical Process Safety (2022) Process Safety Metrics Guide for Leading and Lagging Indicators. Available at <https://ccps.aiche.org/process-safety-beacon>
- IOGP (2016) IOGP Report 556: Process Safety – Leading key performance indicators. International Association of Oil and Gas Producers.
- IOGP (2020) IOGP Report 638: Process Safety Fundamentals. International Association of Oil and Gas Producers . Available at <https://www.iogp.org/workstreams/safety/safety/process-safety/fundamentals/>
- IOGP (2023) IOGP Report 456 v.3: Process Safety – Recommended Practice on Key Performance Indicators. International Association of Oil and Gas Producers.
- Kletz T (2003) 'Still Going Wrong!: case histories of process plant disasters and how they could have been avoided'. (Butterworth- Heinemann)
- Safer Together (2018) Industry collaboration drives industry-wide safety culture. Available at <https://www.safertogether.com.au/resources/products-and-programs/process-safety-metrics>
- Safer Together [https:// www.safertogether.com.au/resources/products-and-programs/learning events](https://www.safertogether.com.au/resources/products-and-programs/learning-events)

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