Process Safety - leading indicators

Michael Baker
Operations Integrity Supervisor
ExxonMobil Australia (Esso Australia P/L)
Agenda

1. Background
   • ExxonMobil Australia
   • Why Process Safety?
   • Process Safety Metrics
   • KPIs

2. Process Safety KPIs at ExxonMobil Australia
   • Implementation
   • Challenges and Opportunities

3. Conclusion
Why Process Safety?

- **1980**
  - **International**: Alexander Kielland semi-sub capsized

- **1988**
  - **International**: Piper Alpha platform explosion

- **1989**
  - **International**: Cormorant Alpha explosion on platform

- **1998**
  - **Australia**: Longford Gas Plant gas plant explosion and fire

- **2005**
  - **International**: Mumbai High vessel collided with platform

- **2006**
  - **International**: Rough platform fire

- **2010**
  - **International**: Erskine platform fire

- **2010**
  - **International**: Deep Water Horizon drilling rig explosion

- **2012**
  - **International**: Elgin platform gas leak

Deaths:
- **1980**: 123 killed
- **1988**: 167 killed
- **1989**: 0 killed
- **1998**: 2 killed
- **2005**: 22 killed
- **2006**: 0 killed
- **2010**: 0 killed
- **2012**: 11 killed
- **2012**: 3 killed

ExxonMobil
Longford Process Safety Event - 1998
Process Safety Metrics – API RP 754

Indicators should drive process safety performance improvement and learning

Clear, consistent guidance and metrics established for **Tier 1** and **Tier 2**

Flexibility for Operators to define **Tier 3** and **Tier 4** as *appropriate to their business*

Indicators should be relatively easy to implement and *easily understood by all stakeholders* (eg, workers, public)

**Tier 3** – Accepted core metrics
- De minimis LOPC Events
- Demands on Safety Systems
- Safe Operating Limit Exceedances

**Tier 4**
- Operating Discipline & Management System
- Performance Indicators

What about **Tier 4**?
KPIs

• “If you don’t measure it, you can’t manage it”

• Barrier Model

• Lagging:
  • Outcome orientated and retrospective
  • Indicate potential **recurring** problems

• Leading
  • Forward looking and indicate performance of barriers that prevent incidents
  • Allow for corrective actions prior to an event
  • Measure of barrier effectiveness / health
Process Safety KPIs at ExxonMobil Australia

Two levels of Process Safety stewardship

1. Safety Case Performance Standards
   - Measuring all aspects of the Management System
   - Tier 3 & 4 tracked in Safety Case
   - 100s of KPIs across multiple assets
   - Reviewed monthly as part of MHF meetings

2. Process Safety Dashboard
   - Measuring the Operating Discipline
     - Step 1: Prioritise
     - Step 2: Review / Report
     - Step 3: Analyse

12 pages of KPIs for 1 asset
Step 1 - Prioritise

- Recognise that **people** are critical to success
- Introduction of **Process Safety Actions**
  - KPIs linked to **Actions**
    - Drive awareness; clarity; understanding
    - Making it personal
    - Ownership
  - Different assets / type of operation
    - Consistent measurement across all assets
    - Allows “roll-up” for Management review
- Ease of collecting, tracking, reporting
  - Sustainable process
- Measure of **Operating Discipline** in the field
### Step 1 – Prioritise (cont)

<table>
<thead>
<tr>
<th>Category</th>
<th>Measurement</th>
</tr>
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<tbody>
<tr>
<td><strong>Integrity Critical Procedures</strong></td>
<td>Operations &amp; Maintenance procedural competency (%)</td>
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<tr>
<td></td>
<td>Procedures beyond validation date (#)</td>
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<td></td>
<td>Integrity Procedure audit compliance (%)</td>
</tr>
<tr>
<td><strong>Safe Operating Limits</strong></td>
<td>Safe Operating Limit Exceedance events (#)</td>
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<td></td>
<td>Well integrity test failures (#)</td>
</tr>
<tr>
<td></td>
<td>Isolation/ Work Permit assessments completed (#)</td>
</tr>
<tr>
<td></td>
<td>Programmed / Inspection Maintenance completion (%)</td>
</tr>
<tr>
<td><strong>Start-up, Shut-down, Abnormal Operations</strong></td>
<td>Alarm rates (#/hr)</td>
</tr>
<tr>
<td></td>
<td>Temporary MOCs overdue (#)</td>
</tr>
<tr>
<td><strong>Defeating a critical safety device</strong></td>
<td>Temporary defeats in place &gt;60 days without MoC (#)</td>
</tr>
<tr>
<td></td>
<td>Temporary defeats overdue (#)</td>
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<tr>
<td><strong>Shift change during an upset</strong></td>
<td>Standing alarms (#)</td>
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<tr>
<td></td>
<td>Shift handover audits completed (#)</td>
</tr>
<tr>
<td><strong>Safety System Activations</strong></td>
<td>Critical Function Test completion (%)</td>
</tr>
<tr>
<td></td>
<td>Critical Function Test failure rates (%)</td>
</tr>
<tr>
<td></td>
<td>Number of Demand on Safety System events (#)</td>
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<tr>
<td><strong>Significant Release</strong></td>
<td>Emergency response drills completed (%)</td>
</tr>
<tr>
<td></td>
<td>Emergency response drills actions open (#)</td>
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<tr>
<td></td>
<td>Risk mitigation actions open (#)</td>
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Step 2 – Review / Report

Tier 3 Indicators
- Shared across the entire organisation
- Frequency = Weekly
- Maintain visibility / awareness of Process Safety
- Immediate sharing of Near Misses / Incidents

Safety Case Performance Standards
- Reviewed with Asset Management
- Frequency = Monthly

Process Safety Dashboard
- Reviewed with Asset Management (Monthly)
  - Shift Supervisors included in discussion
- Reviewed with Senior Leadership Team ( Quarterly)
Step 3 - Analyse

- Trend analysis

- Incident Investigation Review
  - Human intervention is a critical barrier
  - Aged equipment / facilities
  - Abnormal operations

- Annual culture pulse
  - e-Survey tool
Challenges and Opportunities

Maintaining awareness of Process Safety across entire organisation
  • Personnel Safety vs Process Safety
  • APPEA STFS Process Safety video

What does good look like? (Size, Age, Type)
  • Benchmarking
    eg: Is an increase in Demand on Safety System events an indication of:
      1. Increased awareness and better reporting of Process Safety Events
      2. Barrier strength deteriorating causing more Process Safety Events

Process Safety in a low oil price environment
  • Reiterates the importance of keeping it simple; focused; prioritised
  • Maintain sight on the bigger picture
    • Test the value-add of each KPI - is it “appropriate to business”?

Process Safety Actions for:
  • Maintainers
  • Engineers
Conclusion / Key Take Aways

No company or country is immune from significant Process Safety Events

Select KPIs that are:
• Fit for business purpose and risk profile
• Sustainable for the long term
• Visible through all layers of the organisation
• “relatively easy to implement” API RP 754
• “easily understood by all stakeholders, including the workforce” API RP 754

People are critical
• Raise / maintain Process Safety awareness
• Make relevant & seek buy-in
Questions?