Process Safety Management – Way forward

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Cairn India: Asia’s fastest growing oil & gas company

<table>
<thead>
<tr>
<th>Block</th>
<th>Operator</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajasthan (RJ-ON-90/1)</td>
<td>Cairn</td>
<td>70%</td>
</tr>
<tr>
<td></td>
<td>ONGC</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Tata Petrodyne</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>12 blocks</td>
</tr>
<tr>
<td>Cambay (CB/OS-2)</td>
<td>Cairn</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>ONGC</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Tata</td>
<td>10%</td>
</tr>
<tr>
<td>Ravva</td>
<td>Cairn</td>
<td>22.5%</td>
</tr>
<tr>
<td></td>
<td>ONGC</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Videocon</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>Ravva Oil</td>
<td>12.5%</td>
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**3 Production Blocks**
- Gross operated production 175,000 boepd, 100 mmscf (Ravva, Cambay & RJ)
- 25% of India’s domestic crude production
- Rajasthan block under development - Mangala, Bhagyam and Aishwarya fields (MBA)
- 22 other discoveries

**9 Exploration Blocks**
- 6 operated - 4 in India, 1 in Sri Lanka and 1 South Africa
- 4 non-operated
Never say ‘Never again’?

Rig Sea Gem
UKCS 1965
Legs collapsed- 13 dead

Alexander Killeland
Norway 1980
Legs collapsed- 123 dead

Ocean Ranger
Norway 1982
Sank – 84 dead

Piper Alpha
6 Jul 1988
Fire & Explosion – 168 dead

Bombay High North
27 Jul 2005
Fire & Explosion- 22 dead

West Atlas
(Montara) Australia
Aug 2009
Blow-out
Never say ‘Never again’?

- Deep Water Horizon
  Explosion – 2010

- Texas BP Refinery
  Explosion – 23 Mar 2005

- Buncefield London
  11 Dec 2005

- IOC Terminal Jaipur
  29 Oct 2009
Barrier based Analysis of Major Hazard Accidents

Figure 1: KPIs applied to the ‘Swiss cheese’ model (based on the work of James Reason[12,13]):

- **Hazard**
  - Hydrocarbons or other dangerous material

- **Prevention barriers**
  - Leading indicators: maintain barrier strength, i.e., activities to maintain risk control systems
  - Lagging indicators: measure barrier defects ('holes'), events and consequences

- **Escalation barriers**
  - Major incident or other consequence

LOPC event
Why Major Hazard Accidents repeat?

- Focus on ‘Zero LTIR’ regime but not on Process Safety Culture: ‘Needle and the Elephant’

- Inadequate risk controls e.g. dysfunctional barriers

- Huge gaps in Competency Management systems; need to involve field workforce in PSM

- Normalization of risk, Group think

- Lessons learnt are not institutionalized; Public memory is short!
How can we ‘Disaster-proof’ our industry?
Four pillars of Process Safety

• Commit to process safety
• Understand hazards and risk
• Manage risk
• Learn from experience
Nurture a Process safety culture

- Leadership involvement
- Excellent execution at all levels
- Sense of vigilance
- Sense of ‘constructive unease’
CCPS Advocacy on PSM for industry
Role of Leadership

• Multi-disciplinary Process Safety Task Force
• Committed resources (budget and people)
• Launch process safety movement – visible leadership
• Process safety talk during leadership visits
• Communicate KPIs from the top
• Review PS implementation progress in leadership meeting
Challenges / Dilemma

With existing systems, where to start

Process "safety" – seen as a safety function!

Its not for upstream! U/s or d/s of wing valve?

Long time for concept to be visible

Process Safety or Asset Integrity?

Already reporting every week! See that report!

How to measure? MTD/ YTD / absolute / %

Where and when to report?
Asset integrity - An integral part of Corporate responsibility

Asset performance
The ability of an asset to perform its required function while making an optimum contribution to the business

Asset integrity
The ability of an asset to perform its required function effectively and efficiently while safeguarding life and the environment

Process safety
Management of major risk

Technical integrity
Management of hardware risk barriers

Personal safety incidents that primarily affect an individual on each occurrence
PSM Life Cycle: Value Mapping

- Fit for Purpose Design Integrity
- Concept to Commissioning Assurance cycle
- Process Safety Management – Operational Integrity
- Derive value through improved efficiencies
- Sustainable growth - Look beyond compliance
PSM KPIs

- Process Safety Incident reporting
  - OGP Report No.456 – Focus first on Tier 1 & Tier 2
  - GRI reporting – Tier 1 & Tier 2
- Incorporate Tier 1 & Tier 2 criteria into incident reporting system
  - OGP Report No. 456supp, Nov 2011
- Strengthen PS leading indicator reporting
  - Design Tier 3 & Tier 4 criteria for PS reporting

Source: OGP Report No.456
## Leading PS Indicators

### Examples:

<table>
<thead>
<tr>
<th>Management of Change</th>
<th>• % MoCs closed within 1 month of implementation</th>
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<tbody>
<tr>
<td>Mechanical Integrity</td>
<td>• Safety system failure rate (i.e. % of safety devices failed on 1st test)</td>
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<tr>
<td></td>
<td>• Inspections overdue</td>
</tr>
<tr>
<td></td>
<td>• Deferrals due beyond agreed closeout period</td>
</tr>
<tr>
<td>Conduct of Operations</td>
<td>• % Key systems operating outside alarm levels</td>
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<tr>
<td></td>
<td>• Number of long term overrides</td>
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<td></td>
<td>• Well annulus casing policy status</td>
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<tr>
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<td>• Compliance to testing of critical safety devices</td>
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End of the day;  
It’s all about effective risk management!
Any questions?
Protecting People & Environment

Thank You